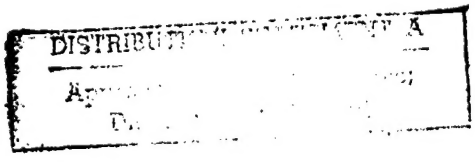

# INFORMATION RESOURCE MANAGEMENT: AN ANALYSIS OF THE IMPORTANCE OF CRITICAL SKILLS AS PERCEIVED BY AIR FORCE COMMUNICATIONS AND INFORMATION COMMANDERS

THESIS

Susan E. Phillips, 1st Lieutenant, USAF

AFIT/GIR/LAS/98S-11








**DEPARTMENT OF THE AIR FORCE**
**AIR UNIVERSITY**
**AIR FORCE INSTITUTE OF TECHNOLOGY**

**Wright-Patterson Air Force Base, Ohio**

AFIT/GIR/LAS/98S-11

# INFORMATION RESOURCE MANAGEMENT: AN ANALYSIS OF THE IMPORTANCE OF CRITICAL SKILLS AS PERCEIVED BY AIR FORCE COMMUNICATIONS AND INFORMATION COMMANDERS

THESIS

Susan E. Phillips, 1st Lieutenant, USAF

AFIT/GIR/LAS/98S-11

The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.

AFIT/GIR/LAS/98S-11

# INFORMATION RESOURCE MANAGEMENT:
# AN ANALYSIS OF THE IMPORTANCE OF CRITICAL SKILLS
# AS PERCEIVED BY AIR FORCE
# COMMUNICATIONS AND INFORMATION COMMANDERS

THESIS

Presented to the Faculty of the Graduate School of Logistics and Acquisition

Management of the Air Force Institute of Technology

Air University

Air Education and Training Command

In Partial Fulfillment of the Requirements for the

Degree of Master of Science in Information Resource Management

Susan E. Phillips, B.S.

1st Lieutenant, USAF

September 1998

**Acknowledgements**

I would like to express my sincere appreciation and gratitude to the members of my thesis committee, advisor Major Mike Morris and reader Major Cindy Fossum. Their guidance, encouragement, and humor made this an enjoyable and worthwhile experience. I also want to thank those that shared my philosophy towards school and always allowed time to stop and smell the roses (or hang out at the ballpark).

1st Lt Susan E. Phillips

## Table of Contents

## List of Figures

## List of Tables

Table Page

**Abstract**

This study explores what Information Resource Management (IRM) skills are required in the Communications–Information career field as perceived by the Air Force commanders. A previous study polled junior officers, and this study furthers the research by sampling commanders who represent the leadership of the Communication-Information career field.

The following questions were addressed: (1) What are the skills commanders perceive as most important to the IRM mission? (2) Of those skills, where do the commanders perceive their organization's members' weaknesses? (3) What are the primary sources of training for commanders in the Communications-Information career field? (4) What expectations do commanders have for the training of their organizations?

The results of skill importance concurred with current literature, including that pertaining to junior Air Force officers. The interpersonal skill category was concluded most important, followed by managerial and then technical. Results of ideal training sources for the career field are presented, advocating a revision to current Air Force technical courses. Notable commander comments referring to skill importance and areas of weakness, as well as viable training sources are provided.

# INFORMATION RESOURCE MANAGEMENT:

# AN ANALYSIS OF THE IMPORTANCE OF CRITICAL SKILLS

# AS PERCEIVED BY AIR FORCE COMMUNICATIONS

# AND INFORMATION COMMANDERS

## I – Introduction

### Background

> *"The Air Force faces a period of profound change. The end of the cold war, a new agenda for the nation, new concepts for managing enterprises, and the revolution of information technology challenge old assumptions and ways of doing business as never before. While we can not foresee all the changes that will occur, we can act now to shape the future, rather than be shaped by it". – General Ronald R. Fogleman, Chief of Staff, United States Air Force (AFIRM-VISTAS)*

In order to meet today's challenges and those into the Twenty-First Century, the Air Force initiated a process review in December 1993 of Command, Control, Communications and Computers (SC) and Information Management (IM) functional career fields. On October 18, 1994, the Secretary and Chief of Staff of the Air Force directed a study be conducted to assess the advantages to be gained by integrating SC and IM functions. Since that time, major commands and wing commanders have acknowledged this need. Cross-functional working groups convened to examine SC and IM processes and to recommend process-based integration in a single organization at wing, MAJCOM, and Headquarters Air Force. Based on the working groups' findings, the Secretary of the Air Force approved their recommendations and directed a program

action directive be initiated to detail implementation planning. On 15 March 1997, the SC/ IM merger was completed and the title of "Communications and Information" was officially designated for the career field with Air Force Specialty Code (AFSC) 33SX.

The increasing use of technologies and the growing power of information was, no doubt, essential in making this decision. Air Force leaders laid out six critical capabilities that will make aerospace power "decisive." (Dudney, 1997:24). One of these core competencies was declared Information Superiority: the power to gain, exploit, defend, and attack information (Dudney, 1997:24). Using information as a strategic resource to achieve a federal agency's mission and improve performance is a program called Information Resources Management (IRM). The Air Force recognized the potential for improved IRM through an integrated SC and IM organization. The goal was that this organization would have a new integrated mission, with integrated processes and a well-trained workforce of officers, noncommissioned officers and civilians focused to meet the information needs of deployed and in-garrison commanders world-wide (HQ USAF PAD 96-03, 1996). As VISTAS, the Air Force Information Resources Management Strategic Plan, clearly states, the Air Force realizes the inseparable relationship between effective information management and communications-computer technology and applications.

The integration of SC and IM processes involved nearly twenty percent of all Air Force personnel making the Communications-Information career field the single largest in the Air Force. Education and training issues were addressed. Both SC and IM personnel would need new skills, new education and new training to meet Air Force mission needs. The Air Force recognized that the skills of SC and IM personnel must be improved to meet the tough challenges posed by information operations, information

warfare and information protection. Air Force personnel must be prepared to meet commanders' needs for information worldwide -- information dominance (Basic Plan, 1996:3).

Those Air Force employees that were previously in the Information Management career field were assimilated into the Communications-Information career field. Although there was little change to the enlisted force structure, the officers' job descriptions and responsibilities were drastically effected. The merged officers are expected to compete for jobs and promotions with their *peers* in the new career field, but there is a controversy surrounding the future of these officers. Although all policy directives state that IM officers integrated into the SC career field must be given adequate training and have an equal opportunity for career progression, many merged officers fear that they are not well prepared. According to Schmidt (1997), many officers feel they do not have the proper skills necessary to accomplish their jobs. The original SC officers are concerned about what changes they must adapt to as well. Also, training and funding for training has been limited due to the large influx of officers, approximately 1,400, to be trained (HQ USAF PAD 96-03, 1996). The Air Force recognizes the delta in education and training effecting the merger and has tried to minimize it to the maximum extent possible (HQ USAF PAD 96-03, 1996). However, there is justified concern about appropriate skills needed, career advancement, and what the Air Force and their commanders expect of them. Under this newly designed force structure, there is a chance that there maybe a disconnect between the Communications-Information commanders' expectations of his/her officers and the new corps of Communications-Information

officers' expectations and skills. As with any major merger or change, there is often confusion and concern for career progression, including training.

There is a need to revise the training program in the Air Force for members in this career field not just to better train the merged personnel, but to educate and update skills for all personnel. Thus far, a set of core skills has not been defined by the Air Force for this new breed of Communications-Information officers. Although Basic Communications Officer Training (BCOT) and Advanced Communications Officer Training (ACOT) have been modified to include Information Resources Management (IRM), there is still concern that the training is inadequate and outdated for today's officers (AETC PPlan 96-07, 1996). Schmidt (1997) provided a set of core skills derived from studying the private sector and emphasized three areas essential for the new Communications-Information officer. This thesis builds on his work, as it will further investigate the climate surrounding the current career field and its necessary skills with an emphasis on commander's perceptions.

**Purpose of Study**

This research will survey present Communications-Information (33SX) Commanders to develop a consensus of their perceptions of what are essential competencies for Communications-Information (33SX) officers. The purpose of this study is also to investigate the perceptions of Air Force Communications-Information Commanders on how well they feel their organization's officers are prepared in the core Information Resource Management skills. As a result, the study will determine if there are specific areas of education and knowledge which Communications-Information

officers are lacking providing a focus point for training development programs. Commanders' perceptions will help in the revision of relevant documents, in development of a new training curriculum for the career field, and provide officers with some guidelines and expectations. Some evidence already suggests that officers in this career field may be lacking the proper educational foundation and knowledge base to accomplish the newly defined Communication-Information officer functions. For example, Schmidt (1997) found that many junior officers were not comfortable or confident in their jobs as a result of the Air Force's initial training program for the career field, Basic Computer Officer Training (BCOT) (Schmidt, 1997:82-83). Also, Scott (1990) found that academic degrees held by these officers were not a large factor for recruitment into the field. Consequently, the results of this study will provide guidance for Communications-Information officers and for training plan development at Air Education and Training Command (AETC). Specifically, this study will analyze what IRM skills are required for IRM professionals as perceived by the Air Force Commanders who oversee IRM duties.

**Investigative Questions**

The following investigative questions are proposed to address the research topic and accomplish the specific objective:

1. What IRM skills do commanders in the field perceive as being most important in performing the IRM mission?

2. How well are these skills exhibited by members of the commander's organization according to commander perception?

3. Where do commanders expect their officers to receive this training?

The information obtained by answering these questions will assist the Air Force in assessing the current and future Air Force IRM training requirements and benefit officers' professional development in this career field.

**Scope of Research**

The scope of this study is limited to all Air Force Communications-Information commanders during the 1998 calendar year. No former or projected Communications-Information commanders were surveyed. In order to have an appropriate sample size, Air Force employees that serve similar roles as commanders, but do not carry the title of commander, such as Division Chief or Flight Commander, will also be surveyed. As senior leaders in the Air Force and in their career fields, the commanders have played an important role in assessing and implementing the merger of SC and IM. Their influence and experience is undoubtedly vital in determining skills and training importance.

**Assumptions**

This study builds on the previous work of Schmidt (1997). It assumes that the core skills presented in his AFIT thesis are valid for the Communication-Information career field and are considered an appropriate skill set for Communications-Information officers.

## Organization of Thesis

Chapter I provides an overview of the research effort. It includes the background information necessary to understand the specific research questions while providing the motivation of the importance and value of the study. It specifies the specific objective, the investigative questions, the scope of the research and the assumptions made in order to conduct such a study.

Chapter II is a review of the pertinent and current literature involved in this study. Subject matter included are overviews of the IRM construct, IRM in the Air Force, current IRM skills and training strategies.

Chapter III describes the methodology used in answering the specific objectives and investigative questions. It will also outline the method used for data analysis.

Chapter IV is the analysis of the data collected from the survey accomplished by the participants. First, the demographics of the study are presented. Next, the data on what IRM skills commanders deem most important is presented, followed by information related to sources of training.

Chapter V presents the findings of the study. Conclusions and recommendations are discussed based on the analyzed data.

# II – Literature Review

## Introduction

> "The traditional roles, responsibilities and career paths of today's information technology professionals are in the midst of massive upheaval in the face of widespread business re-engineering and technological change. As information technology increases in its power to change business, the best professionals will become more valuable. Your ability to survive this inevitable change depends on mastering the critical skills that will be required of an information technology professional in the year 2000. Critical skills are not learned quickly; therefore [IT professionals] must act now to ensure a prosperous and long-term future". (Martin, 1995:37)

This review presents literature that is applicable to research concerning the field of Information Resource Management (IRM) as a whole, in industry, and in the United States Air Force. Specifically, this review provides a foundation for the understanding of fundamental IRM principles, an overview of efforts to address IRM issues in the Air Force, a current consensus of skills needed by IRM professionals, and suggestions for training strategies and career development in the Air Force.

## The IRM Construct

In order to better understand the situation faced by the Air Force, it is imperative to comprehend the IRM construct. The concept of Information Resource Management was introduced in the mid-1970s by the U. S. federal government as part of its attempt to diminish the paperwork burden on the general public. IRM was presented as a planning and control mechanism in the context of records management, although the term IRM referred to information in a broader context than just hardcopy documents (Lewis,

1995:201). As early as1965 the Brooks Act had provided a working definition of Automated Data Processing Equipment (ADPE) (USC Title 40, 1989; Harkleroad,1992:3), yet no definition was provided for IRM until 1986. In 1986 Public Law 99-500, the Paperwork Reduction Reauthorization Act, provided this definition:

> The term IRM means the planning, organizing, controlling and management activities associated with the burden, collection, creation, use and dissemination or information by agencies, and ... includes the management of information and resources such as ADPE. IRM involves managing data in such a way that the program and agency managers are able to obtain and use information efficiently, effectively and economically. (USC Title 44, 1989; Harkleroad,1992:4)

Furthermore, the Paperwork Reduction Act of 1980 defined information as a resource and directed that a senior IRM official in each federal agency be designated for its management and control [USC Title 44] (Harkleroad, 1992:3). Over time, this role has evolved into the present Chief Information Officer (CIO) which will be discussed further in the next section. In an empirical assessment of the IRM construct, Lewis, Snyder and Rainer defined Information Resource Management as:

"A comprehensive approach to planning, organizing, budgeting, directing, monitoring, and controlling the people, funding, technologies and activities associated with acquiring, storing, processes and distributing data to meet a business need for the benefit of the entire enterprise" (Lewis, 1995:204).

The use of information as a corporate resource is not a completely new concept. Even in 1979 it was believed that information management would be more than simply an administrative function. According to Diebold, "It is clear that the organizations which excel...will be those that recognize information as a major resource and structure it as efficiently as they do other assets" (Diebold, 1979:50-53). Throughout the 1980s

this concept was explored and expanded but didn't seem to be internalized. Though some companies had designated information managers, their job descriptions were rarely standardized and responsibilities misunderstood by fellow workers. Attempts were made to define the roles of information mangers as Meltzer's book depicts. He states:

> The information manger must be familiar with all aspects of the information industry, so that the various elements that will best serve the organization's needs are melded. The information manager must have both the education and attitude of a manger, not that of a specialist or technician. He or she is the generalist with the knowledge and skills necessary to plan, organize, and control the information resources of the company. The information manger understands the behavioral aspects of management as well as the technological aspects of information science. (Meltzer, 1986:122)

The progression and growth of the IRM concept in the 1990s began slowly and then exploded as one company after another reaped gains from implementation of information resources such as better technologies and better skilled people to manage them. The inundation of personal computers in the 1990s created a larger pool of computer literate people for employers to choose from. Researchers have struggled with many aspects of their own studies partly due to the swift pace of changes involving computers and the environment created by computers in our society.

Early literature focuses more on the question "what is information?" More current literature represents a shift in researchers' views from defining the corporate resource in order to understand it, to appropriate and successful ways to manage and implement it. This portrays the sense that the acceptance of IRM, even as a multifaceted concept, has essentially been realized and respected, and the desire to better manage it is of great importance. In their 1995 attempt to harness the IRM construct Lewis, Snyder and Rainer claimed that "a means of assessing the extent to which the IRM concept is

implemented in an organizational setting does not exist. Given that IRM has received so much exposure, the question arises as to how IRM is empirically related to other organizational factors" (Lewis, 1995:201).

Although there are many different definitions of IRM, they are all similar in addressing the basic concepts in managing the new corporate resource: information. However, the management of information has been a challenge because no other resource is as dynamic. As the IRM principles were being developed and realized during the past two decades, it became clear that to manage a resource effectively, the nature of that resource must be defined and understood in order to be implemented successfully. The early literature on IRM provides a vast terminology, and researchers offer many definitions, but a list of some important IRM terms relevant to this thesis are provided.

Chief Information Officer (CIO) - Responsible to head the agency regarding acquisition of information technology; management of information resources and establishing a Capital Investment Plan for information technology (AFCIO - Definitions web page).

Information Dominance - A condition in which a nation possesses a greater understanding of strengths, weaknesses, interdependencies, and centers of gravity of an adversary's military, political, social, and economic infrastructure than the adversary has of that nation (AFCIO - Definitions web page).

Information Management (IM) - The functional proponents creation, use, sharing, and disposition of data or information as corporate resources critical to the effective and efficient operation of functional activities consistent with IM guidance issued by the Command, Control, Communications, Computers and Intelligence (C4I). It includes the

structuring of functional management improvement processes by the Office of the Secretary of defense Principal staff Assistants to produce and control the use of data and information in functional activities; information resource management; and supporting information technology and information services. Also it will be referred to in thesis as IS (information systems) and IT (information technology) (AFCIO - Definitions web page).

Information Resources - Information and related resources, such as personnel, equipment, funds, and information technology (AFCIO - Definitions web page).

Information Resource Management (IRM) construct - a comprehensive approach to planning, organizing, budgeting, directing, monitoring, and controlling the people, funding, technologies, and activities associated with acquiring, storing, processing, and distributing data to meet a business need of the entire enterprise. (AFCIO - Definitions web page); Lewis, 1995:199)

Skill - the ability to perform specialized work with recognized proficiency (Scott, 1990:4)

Training - a short-term activity with a specific goal. It is distinguishable from education as education is a long-term activity designed to build a foundation of knowledge and reasoning abilities. Training builds upon an educational foundation to develop skill or teach performance of a process rather than reasoning about a process (Scott, 1990:4; Cascio,1991: 361).

**IRM and the Air Force**

> "Just as businesses are guilty of operating without a clear vision of where they want to go, so too are many information technology professionals. Unless you know where you want to go professionally, [IT professionals] will never get there. Only by continually revisiting your goals and expectations and challenging your assumptions about your skills and the demand for your services, can [IT professionals] hope to achieve success". (Martin, 1995:37)

The Air Force has been challenged more than once to keep up with the changes faced by its Information Managers. Almost a decade ago in the Air Force, a conversion of the career field took place. In 1989, the former Administration career field was converted into the Information Management career field by three separate Secretary of the Air Force Orders (SAFOs): SAFO 100.1, Authorities and Duties of the Administrative Assistant to the Secretary of the Air Force (19 Nov 87); SAFO 110.1, Functions of the Secretary, Under Secretary and the Assistant Secretaries of the Air Force (21 Apr 88); and SAFO 560-1, The Air Force Information Resource Management Program (7 Sep 88) (Nations, 1989:1). At the time, Colonel William O. Nations, Director of Information Management and Administration, attempted to summarize the new changes for those affected by stating "SAFO 100.1 describes, in broad terms, the general responsibilities of SAF/AQ as they pertain to the Air Force IRM program. SAFO 560.1 gives more focus on IRM responsibilities. (Finally), SAFO 110.1 describes the specific responsibilities of SAF/AA as they relate to IM activities" (Nations, 1989:1).

However, according to Scott (1990), "despite the early efforts to inform the career field of these changes, the news was not well publicized nor readily available" (Scott, 1990:18). She emphasized that the Air Force created a mission statement, and defined the roles of a new career field that was made up of the old personnel: an unqualified

personnel. Her work identified that there were training deficiencies the Air Force must respond to in regards to IRM.

In Lieutenant Don Schmidt's (1997) thesis titled IRM: An Analysis of Critical Skills, Training Sources, and Training Adequacy as Perceived by Air Force Communications and Information Officers, he found that there was little or no training available for most of the necessary skills of an Air Force information resource manager. Almost a decade after the first career field conversion, the situation did not appear much better for Air Force officers. Both Scott (1990) and Schmidt (1997) found that the Air Force does not actively recruit its Information Management officers based on degrees with IRM or computer backgrounds. Perhaps the Air Force, in identifying and then nurturing the skills of its information managers, needs to take this into account.

As stated in Chapter I, 1996 brought about another career field merger. IM and SC were merged because studies had shown that it would lead to a more efficient use of information and information resources. The IRM program VISTAS states:

> The Air Force must have information superiority to operate effectively and defend air and space. Information is also critical to Air Force business processes. In the future, the Air Force will need to do business more effectively and efficiently. To meet the challenges of the future, the Air Force must manage information as a strategic resource to enhance the Air Force mission. All members must understand the value of information resources, and use them more effectively and efficiently. (AFIRM -VISTAS)

In 1997, Secretary of the Air Force, Sheila E. Widnall, defined the duties and responsibilities of the CIO under three main categories: information technology management, information resources management, and capital planning and investment control. These responsibilities are as follows:

> Information Technology Management: The CIO will promote effective Air Force operations through use of information and appropriate IT solutions to mission requirements. The CIO will ensure that prior to making an investment in a new information system to support a particular function, the function shall be reviewed to determine if it should be performed or supported by the private sector or another agency. For those functions which will be performed within the Air Force, the CIO will also ensure that function's processes are reviewed, and where appropriate, restructured before applying an IT solution (DoD SAFO 560.1).
>
> Information Resources Management: The CIO will over see the implementation of information resources management in accordance with the requirements of the PRA as implemented by the Office of Management and Budget Circular A-130, Management of Information Resources. The CIO will ensure that information management policies are implemented as directed in 7900 and 8000 series DoD publications and that Air Force responsibilities as described in DoD Directive 8000.1, paragraph E4 are fulfilled (DoD SAFO 560.1).
>
> Capital Planning and Investment Control: The CIO, in conjunction with the Air Force Corporate Structure, will implement a process for maximizing the value and assessing and managing the risks of information technology acquisitions. This process will be integrates with the Air Force budget, financial, and program management processes and will provide senior management with performance criteria by which to evaluate, select or discontinue information systems investment projects for the Air Force (DoD SAFO 560.1).

Although policy clearly states a need for a strong IRM program it does not specify responsibilities other than those of the CIO. For those at lower levels performing the duties associated with information resource management, no guidance as to what skills these personnel need to complete the tasks and how training will be implemented has been determined. The Air Force's bottom line is "the lack of information or connectivity must never be the limiting factor in the execution of the Air Force mission" (CIO home page). The Air Force must not only recognize this from a top-down perspective but from a bottom-up one as well.

**Current Skills**

There have been several attempts to compile lists of necessary IRM skills ranging from researchers' views to want ads descriptions. There are ongoing debates about how to organize and structure universities' curriculum to produce the best graduates in this field. Arguably, there are certain skills that academia and business agree are the foundations of an IS education, but identifying the latest list in a field of rapid and continuous change, has proven difficult.

At the 1997 Association of Information Systems (AIS) conference, a survey, using rankings of importance, of IS and IT professionals found five knowledge and skill areas need to be assimilated into the core curriculum: database, systems analysis/project management, telecommunications and networks, programming and data structures, and large systems application implementation (Ching, 1997:1010). As a common body of knowledge, they provide the building blocks from which other specialized skills can be developed (Ching, 1997:1012).

Numerous studies have also been conducted by businesses and corporations in the hiring criteria used to evaluate job candidates. It has been consistently found that businesses are looking for not only IS technical skills but also a mixture of managerial and interpersonal skills. "The relative need for technical and interpersonal skills varies by job category: technical skills are more important for programmers, and interpersonal skills are more important for end-user support personnel." (Young and Lee, 1997:50). "Although technical skills are still needed to perform systems analysis tasks, IS professionals must possess interpersonal skills and business knowledge if they are to succeed in today's work environment" (Young and Lee, 1997:50).

Several studies lay groundwork for generating a similar theme of skill needs. Trauth, Farwell, and Lee (1993) attempted to determine what skills would be required of the future information systems professionals. Their findings were divided into three categories of skills needs; IS Tasks, Technical Skills, and Abilities (which is further broken down into human, business, and technical) (Trauth, Farwell, and Lee, 1993:297). A complete list of the baseline of required skills, as identified by Trauth, Farwell, and Lee, can be found in Appendix A.

In 1995 the same group of researchers devised another study to investigate anticipated changes in the IS profession, to study the impact of these changes on skills and knowledge needed, and to compare the requirements to academic curricula of future IS personnel. Again, the researchers found that core skills could be identified and categorized into groups: (1) technical specialties knowledge/skills; (2) technology management knowledge/skill; (3) business functional knowledge/skills; and (4) interpersonal and management knowledge/skills (Lee, Trauth, and Farwell, 1995:323). This list is provided in Appendix A.

Young and Lee (1997) furthered the research by studying IS hiring practices of recent graduates into the corporate sector. Once again the IS skills were commonly grouped into categories that included knowledge (including technical abilities), interpersonal and group skills, and organizational or business experience (Young and Lee, 1997: 49). Appendix A lists the complete list of required skills identified by Young and Lee's hiring criteria research.

Part of Schmidt's (1997) work involved analyzing and classifying skills identified in the literature. Though many different studies were conducted and different names

were given to the kinds of skills found necessary, all the skills could be broken down into three distinct groups: (1) technical skills; (2) managerial/business skills; and (3) interpersonal skills. Appendix A lists the skills identified by each research effort.

The importance of technical, managerial, and interpersonal skill areas is highly stressed by all the research, however, some studies found that greater emphasis should be placed on one or the other. The general theme evolving from the research was "the need for a *high-quality person* with general intellectual depth, solid interpersonal and communication skills, and some functional business knowledge" (Trauth, Farwell, and Lee, 1993:294). Lee, Trauth, and Farwell suggest that "industry will demand a cadre of IS professionals with knowledge and skills in technology, business operations, management, and interpersonal skills to effectively lead organizational integration and process reengineering activities" (Lee, Trauth and Farwell, 1995:313). Longenecker, Simonetti, Mulias (1996) feel that a balance is the answer:

> Today's IS professionals must be a master craftsperson—balancing technical competency with a growing list of skills and characteristics that have frequently discounted or deemed less than critical for the technically competent IS professional. These skills clearly demonstrate the expanding business and customer orientation needed in the future. (Longenecker, Simonetti, and Mulias, 1996:28)

These researchers have unveiled a pattern established in the realm of IRM exploration. This pattern takes into account the three skill areas, technical, managerial, and interpersonal, needed in the IRM domain. A look into how universities are recognizing critical skills also seems to support researchers' findings.

In 1994 and 1995, joint task force meetings were established to initiate the curriculum project known today as IS '97 Model Curriculum for Undergraduate Degree

Programs in Information Systems. The IS '97 report is the latest output from model curriculum work for information systems that began in the early 1970s and has matured over a twenty year period. The report represents the combined effort of numerous individuals and reflects the interests of thousands of faculty. It is grounded in the expected requirements of industry and represents the views of organizations employing the graduates (IS'97 web page). The educational philosophy of the IS curriculum is to produced graduates equipped to function in entry-level positions with a foundation to continued growth. The curriculum responds to industry requests for both increased emphasis in technical orientation and improved skill in individual and group interactions (IS'97 web page). The exit characteristics of IS graduates, as shown in the following table on the next page, are elaborated by lists of abilities required to achieve them and knowledge that is applied.

**Table 1. Representative Capabilities and Knowledge Expected for IS Program Graduates**

| Characteristic | With the ability to... | Using the knowledge of... |
|---|---|---|
| Communication | -accurately observe, note and explain observations of events<br>-actively listen and express complex ideas in simple terminology<br>-organize and make presentations<br>-write memos, reports and documentation | -listening, observing and documenting<br>-interviewing and speaking<br>-negotiating and facilitation<br>-presentation and interpretation of data<br>-multimedia development and utilization<br>-computer and video conferencing techniques |
| Computer Applications Systems | -apply IS solutions to functional, inter-organizational, operational, managerial and executive problems and opportunities<br>-describe characteristics of various systems | -organizational theory, structure and functions<br>-characteristics and capabilities of systems and technologies |
| Information Technology and Tools | -describe the functions and components of computers and networks<br>-select and apply software tools for organizational solutions<br>-install and integrate purchased solutions<br>-develop and manage distributed systems with high-level tools and methodologies | -computer and networking concepts<br>-distributed systems<br>-database implementation and management<br>-programming languages and environments<br>-security and privacy management |
| Interpersonal Relationships | -effectively working with people of diverse backgrounds and at all corporate levels<br>-lead and facilitate in a collaborative environment<br>-develop win-win approaches<br>-empathetically listen and seek synergistic solutions | -leadership, management and organizations<br>-small group communications and motivation<br>-organization, team and individual goal setting<br>-shared vision and responsibilities<br>-cultural diversity |
| Management | -establish project goals consistent with organizational goals<br>-specify, gather, deploy, monitor and direct resources and activities<br>-observe the need for paradigm shifts<br>-apply concepts of continuous quality improvement | -mission planning, goal setting and tracking<br>-project and steering team operation<br>-planning and resource management<br>-leadership, motivation and team building<br>-measurement and benchmarking |
| Problem Solving | -recognize the need for the applications of analytic methods<br>-devise questions that will identify problems<br>-apply systems concepts to definition and solution of problems<br>-formulate creative solutions to simple and complex problems | -technical observation and writing<br>-problem solving models<br>-life cycle stages<br>-creativity techniques<br>-methods to collect, summarize and interpret data<br>-statistical and mathematical methods |
| Systems Development Methodologies | -select and utilize appropriate methodologies<br>-use tools and techniques to analyze, design and construct an information system<br>-assess feasibility and risk assessment for projects<br>-apply design methodologies compatible with organization settings | -systems development life cycle<br>-prototyping, purchasing, and outsourcing<br>-feasibility and risk analysis<br>-standards |
| Systems Theory and Concepts | -apply systems representatives and life cycle concepts<br>-represent organizational processes and data using formal methods<br>-identify interfaces, boundaries and components of problems<br>-apply solution checking and reality testing mechanisms | -general systems theory<br>-control systems concepts<br>-quality, effectiveness and efficiency concepts<br>-business process modeling and reengineering<br>-business process data, logic and event modeling |
| Professionalism | -apply personal goal setting and time management concepts, and decision making skills<br>-articulate a personal position and respect the opinion of others<br>-adhere to ethical standards<br>-assess organizational and societal impacts of IS<br>-actively seek and employ current practice | -codes of conduct<br>-ethical theory<br>-legal and regulatory standards<br>-generally accepted practice standards<br>-record keeping and reporting<br>-international standards, culture, and practices<br>-stakeholder needs |

The curriculum is designed to produce the *high-quality person* mentioned earlier. It has formal information systems courses but also assumed use of prerequisite and corequisite courses in communications, mathematics, and statistics, and business functions. The communications prerequisite courses should provide students with listening skills and the knowledge to be effective in written and oral communication. The mathematics and statistics prerequisites should provide basic quantitative and qualitative techniques. The business courses should cover common business functions, economics, and international considerations (IS'97 web page). In addition to describing these broad skills, the IS 97 report also provides a list of twenty significant IS topics that need to be attained to graduate. These subareas are illustrated in table 2.

**Table 2. Knowledge/Competency Levels for Significant IS Curriculum Sub Areas of Study**

(Levels: 0= no knowledge; 1= recognition; 2= literacy; 3= usage; 4= application)

| **Significant Subareas in IS 97 Curriculum** | Depth of knowledge/Competency Levels for | | |
|---|---|---|---|
| | All Students | IS Minors | IS Majors |
| Literacy in computers and information systems | 3 | 3 | 4 |
| Knowledge work software packages | 4 | 4 | 4 |
| Systems theory and quality | 2 | 3 | 4 |
| Decision making | 1 | 2 | 3 |
| IS planning | 1 | 2 | 3 |
| IT and organizational systems | 1 | 2 | 4 |
| Computer systems hardware | 1 | 2 | 3 |
| Computer systems software | 1 | 2 | 3 |
| Networking and telecommunications | 2 | 3 | 4 |
| Programming: languages and implementation | 1 | 2 | 3 |
| Algorithmic design and data, object and file structures | 1 | 2 | 3 |
| Software development | 1 | 2 | 3 |
| Database: modeling, construction, tools | 1 | 2 | 4 |
| Information systems analysis, design, implementation | 1 | 3 | 4 |
| Teams, persona, and interpersonal skills | 2 | 2 | 4 |
| Project management | 1 | 2 | 3 |
| IS support services | 1 | 2 | 2 |
| Systems integration | 1 | 2 | 3 |
| Management of IS function | 1 | 1 | 2 |
| Information resource management | 1 | 1 | 2 |

Although the work completed by the task force meetings to achieve IS 97 is considerable, the committee admits that the curriculum updating cycle has been too slow to meet the needs of academia and industry. However, what is important to note is that the curriculum as a whole, past and present, strongly advocates a need for a balanced individual with technical, managerial and interpersonal skills.

The following table, reproduced from Schmidt (1997), represents core skills for the IS professional as identified in the current literature:

**Table 3. Core Skills Identified in the Current Literature**

| CORE SKILLS IDENTIFIED IN CURRENT LITERATURE | | |
|---|---|---|
| **Managerial** | **Technical** | **Interpersonal** |
| Project management (1,2,4,5) | Operating systems(1,2,3,4) | Verbal Skills (2,3,4,5) |
| Analyze business problems (1,2,4,5) | Development of applications (3,5) | Cross-functional group work (3,4) |
| Manage and plan new systems and technology (2,4,6) | Management of applications (2,4,5,6) | Written communication (3,4,5) |
| Maintain client/user relationship (1,2,5,6) | Networks (1,2,3,4) | Work group software (3) |
| Understand business environment (1,2,4,5) | Languages (1,2,3,4,5) | Persuasion (4) |
| Ability to understand trends (1,2,4) | Personal computer tools (4) | Disseminate information (2,6) |
| Politics (1,2) | Telecommunications (1,2,3,6) | Provide documentation (2) |
| Organizational culture (1,2) | Data communications (2,6) | Team and group projects (1,2,4,5) |
| Deal with ambiguity (1,2) | CASE tools (1,2,3,4,6) | Ability to train others (1,4,6) |
| Ability to learn business functions (1,2,4,6) | Relational databases (1,2,3,4,6) | Responding to emotions (4) |
| Ethics (4) | Systems integration (1,2,6) | Ability to function as teacher and coach (1,2,4,5,6) |
| Perform cost/benefit analysis (4) | Information security (4,6) | Ability to work closely with customers...maintain client relationship (1,2) |
| Self-directed and proactive (1,2,4) | Prototyping (4) | Plan, organize, and write clear...documentation (1,2) |
| Ability to learn new technologies (1,4,6) | Systems life cycle management (1,2,4) | Presentation skills (i.e. briefings) (1,2,4) |
| | Decision support systems (1,2,4) | |
| | Expert systems/artificial intelligence (1,2,4) | |
| | Distributed processing (1,2,4,6) | |
| | Systems analysis/structured analysis (1,2,4,5) | |

Key: 1 = Lee et al. (1995) 2 = Trauth et al. (1993) 3 = Young and Lee (1997)
4 = Leitheiser (1992) 5 = Longenecker et al. (1996) 6 = Lewis et al. (1995)

The literature clearly depicts three areas of skill importance in carrying out IS responsibilities. Although the Air Force has placed a growing emphasis on IRM needs and policy, it has not identified any kind of skills list needed to perform the IRM functions. Literature in this area is helpful to determine a set of skills, but research in the Air Force is needed to better understand how the Air Force's needs may differ from those

of private industry. Universities have made considerable advancements in determining a model curriculum and the Air Force should understand how to better utilize this resource. Schmidt (1997) attempted to gather the Air Force perspective by surveying junior officers in the Communications-Information career field. This thesis will further that effort by surveying their commanders.

**The Training Environment and Career Management**

> "The technologies are changing so quickly that our training systems can't keep up. It is absolutely essential that the training people develop an agile, flexible, and focused training program for technology, and invest the time, money, and manpower to ensure that it's available where it's needed". – Air Force Information-Communication Officer (Schmidt, 1997:82)

Career management is essential to any organization. The Air Force has a daunting task considering the many different career fields it must monitor and maintain. It is not surprising that this function could be often times neglected especially when things in that career field are running smoothly. However, when there is upheaval in a career field, such as the merger caused in the Communications-Information career field, particular attention should be given to the management of members' career paths. Organizations need to move individuals along career paths in order to develop the breadth of abilities necessary to fill various levels and types of jobs. Walker (1980), in Human Resource Planning, says career paths should "specify aquirable skills, knowledge, and other specific attributes required to perform the work on each position along the paths, and not merely educational credentials, age, or work experience, which may preclude some capable performers from career opportunities" (Cascio, 1991:243). It is the responsibility of the OMS to conduct a systematic analysis of job dynamics so that

the future staffing of those jobs ensures that necessary skills, motives, and values will be represented in the job incumbents. Job and role planning are a critical part of organizations' Human Resource Office or in the case of the Air Force, Air Force Personnel Center (AFPC).

Some corporations have established their own internal systems to impose standards on job descriptions and skills such as Armstrong World Industries who developed a career ladder that defines 27 skills and spells out proficiency levels for each (Davis, 1993:30). The Data Processing Management Association (DPMA), (now called the Association for Information Systems Professionals, AISP), has recognized that this is an industry-wide problem and individual company solutions pose a problem with standards. The DPMA started the "Professional Development Program" designed to set performance standards to cover all functional areas of IS work. It describes positions and skill categories along with ten levels of professional development, from unskilled entry positions to senior management positions.

The military is no stranger to utilizing industry and universities for additional training in many of its career fields. However, the Communications-Information career field technical schools provided by the Air Force have been struggling to keep up with changes. According to the research, personnel in the field do not feel that are being properly or adequately trained for performing IRM functions (Schmidt, 1997:82). The research revealed that personnel generally feel the training currently employed for the career field is ineffective, inadequate and needs to be reorganized, particularly since the merger.

There have been attempts to redesign career education and training programs for people in the information management career fields. None, however, have become the official or last word on the issue. "Our focus...was to redirect training to coincide with rapidly changing duties and responsibilities of information managers a result of rapidly evolving computer hardware and software technologies and the ongoing merger of communications-computer and information management functional areas" said CMSgt. Jake Mayenzet from Air Force Space Command's new communications and information directorate. Unfortunately, the career field had many aspects and many disconnects among its leaders' visions and without knowing a clear vision of what skills would be needed by the new career field, little definitive plans and directions were reached.

Technical skills are very dynamic, so it is increasingly difficult to keep up with the changes. This is a dilemma also faced by universities and colleges offering MIS degrees. It is recommended that teaching theoretical concepts and methodologies should take precedence over merely training students on specific software tools (Holmes, 1997:1004). A way to gain, or reaffirm these skills, at the practitioner level, has been to become certified in various software or specialized skills. For example, certification programs are supported by Novell and Microsoft. Professionals can strengthen their technical skills by attaining a Certified Novell Administration (CAN), a Certified Novell Engineer (CNE), and a Microsoft Certified Systems Engineer (MCSE) as well as certification in Lotus Notes and PowerBuilder (Holmes, 1997: 1004). Higher-level certification can be obtained from two independent organizations, the Institute for Certification of Computing Professionals (ICCP), and the Network Professionals Association (NPA) (Holmes, 1997:1004). Corporations are taking advantage of these

resources in order to keep their employees skill levels current and innovative. Since most of the Communications-Information officers are not direct recruits of MIS undergraduate programs, there is an even greater need for the Air Force to also take advantage of skills training outside of the Air Force.

The Air Force has been on a steady moving path since the merger to try to define, specify, and understand just where the focus should be to maintain a successful implementation plan. In 1997, Federal Computer Week reported that as agencies began to prepare their budget submissions for fiscal year 1999, they confronted, for the first time, the gap in knowledge about information technology and business management between IT professionals and non-technical executives (FCW web page 23 Jun 97). Eliza McClenaghan heads a committee of the Federal Chief Information Officers Council that is working on ways to bring agencies up to speed. After issuing the "core competencies" that technical and business managers must have to do their jobs, the group now is working to develop a method for agencies to use to determine how much training it will take to teach the employees these new skills and to help agencies figure out how to pay for it (FCW web page 23 Jun 97). "It will not be easy", said Judith Weller, a senior analyst with Gartner Group, which specializes in technology management. "Although there are numerous tools and training programs designed to evaluate employees and teach them specific technical skills few sources exist for teaching IT professionals such *soft skills* as understanding how an agency runs or how to adapt to changes in business operations and technology" (FCW web page 23 Jun 97). John Keane, the associate director with DMR Group Inc., consulting firm said that federal managers are skeptical whether their agencies can even afford to maintain their skills. "In reality, training

continues to be: What are the popular conferences to go to or what are the things that are really burning the organization right now" (FCW web page 23 Jun 97).

Some training programs are cropping up in individual agencies, but only the National Defense University has responded with a formal curriculum that will certify that managers have the skills the Clinger-Cohen Act demands. The school has developed a CIO certificate program that focuses on ten subject areas directly related to CIO competencies identified by the Federal CIO Council. See Appendix B for curriculum.


**Figure 1. Federal CIO Competencies**

Each subject is tracked to one or more courses that educate the student in a particular subject area. For example, the subject area *Process Improvement* is taught in the following courses: Reengineering Organizational Processes, Evaluating Strategic Alternatives with Modeling and Simulation, and Electronic Commerce: Doing Business on the Information Highway. Some courses are primary offerings, while others are enrichment (AFCIO-NDU web page). Appendix B provides the full course listing for the CIO Certificate Program.

Even though some strides have been made in the training area at high levels, there still is a gap in the training of the base level and unit level Communications-Information officers. The Air Force philosophy of professional development and training could benefit from the work already accomplished at high levels and ongoing in industry. The Air Force has created a new career field made up of many different types of talent and educational backgrounds but has provided most of its members with little direction. Those individuals are placed in difficult situations and must be proactive in forwarding the Air Force's IRM cause. A consolidation of industry and military practices concerning professional development and training could lead, not only to a more fluent understanding between industry and military, but would allow the military to catch up in a field that is in jeopardy of being poorly directed and managed. According to McClenaghan, "A baseline for training spending must be created to measure money spent over time." McClenaghan thinks " we're going to find we don't spend the same amount of money as the private sector does on training" (FCW web page 23 Jun 97).

The Air Force has an established mode to meet the changing needs of education and training periodically by revising the Career Field Education and Training Plans (CFETP) for their officers and enlisted personnel and the Career Program Master Development Plans (CPMDP) for their senior civilian personnel. CFETPs recognize the need for five types of training including initial skills, upgrade, qualification, advanced and continuation training. Through this formal process, the delta between changes in policy and procedures and changes in education and training is minimized to the maximum extent possible (HQUSAF PAD 96-03). However, since the IM-SC merger, these documents still remain vague regarding initial skills.

## Conclusion

This chapter has given a brief overview of the IRM construct and some background of IRM and the Air Force. It has also reviewed some of the current literature regarding core skills required to perform IRM functions and responsibilities. Finally it discussed the current training environment. Supplemental information regarding core skills, as derived from the literature, is provided in Appendix A.

# III – Methodology

## Overview

This chapter describes the methodology used to answer the investigative questions specified in Chapter I. Explanations about population, sample size, survey content and design, and survey administration are given.

## Population

This research is designed to assess the perceptions of Air Force commanders in the Communications-Information career field (33SX). Commanders were chosen because their positions as heads of individual Communication-Information squadrons allow them to have a top-down view of the career field as it pertains to their units. Also, commanders are responsible for setting policies within their organizations and influence promotions. Their experience and knowledge of core skills has helped foster their ability to become squadron commanders and leaders in this career field. Previous work has been documented concerning junior officers in the Air Force and their perceptions about core skills however, commanders were not surveyed in that study. A group of 242 Lieutenants and Captains were surveyed representing the junior officers of the Air Force. It is advantageous to the career field to gather similar feedback from the leaders (commanders) in this career field to determine if there are any disconnects or similarities in the perceptions of each.

A list of current Communication-Information commanders and similar positions was compiled from the Air Force Institute of Technology (AFIT) Registrar's office. There were 210 total officers that held the duty title of *commander*, *director* or *chief*. These titles included squadron commander, flight commander, chief of communications/information, director of communications, and senior information resource manager. The ranks of these individuals ranged from Second Lieutenant to Lieutenant Colonel, with the majority being majors or Lieutenant Colonels. At the request of Headquarters Air Force Personnel Center (HQ AFPC), Colonels were not surveyed. Surveys were sent to all 210 commanders. The table below shows the breakdown of the ranks of the commanders who were sent a survey as compared to the total number of that rank in the whole career field. This study is top-heavy regarding rank due to the fact that commanders were the target population. Therefore, it is reasonable to assume that the majority of officers would be field grade officers and not junior officers as the table shows.

**Table 4. 33SX Rank Distribution of Commanders**

| 33SX RANK DISTRIBUTION | | |
|---|---|---|
| | **Commanders** | **All 33SX Officers** |
| LtCol | 93 | 565 |
| Major | 73 | 838 |
| Captain | 22 | 1563 |
| 1st Lt | 10 | 987 |
| 2nd Lt | 12 | 526 |
| Total | 210 | 4479 |

## Data Collection Procedures

Survey Design

The survey was based on the skills analyzed and organized by Schmidt (1997). As this is a follow-on research project, consistency was needed to formulate comparisons between the two different groups being surveyed (junior officers and commanders). Minor modifications were made to the Schmidt (1997) survey, such as eliminating the section rating the *adequacy of training* and adding an *ideal training source* section to explore commanders' viewpoints. This questionnaire consisted of six different parts. They are as follows:

Part I gathers demographic information such as rank, Air Force Specialty Code (AFSC), shreadouts, time in current AFSC, training, education, and overall time in the Air Force. This data will categorize trends in the responses.

Part II was the list of 24 skills pertaining to the IRM concept, which will be repeated in each of the following sections. Participants were asked to rate the importance of these skills in performing IRM functions. The numerical answers to these questions allow the skills to be ranked based on their mean scores.

Part III of the commander's questionnaire aimed at gathering information on the commanders' perceptions of their own organization's skills. The commanders were asked to rank their general perception of the same 24 skills exhibited by their officers or those performing IRM duties in their organizations. This differs from Part II in that it seeks to find out what skill areas commanders perceive their organizations to be strong or weak. Mean scores will also be determined.

In Parts II and III, a five-point Likert scale was used to standardize the answers, and gather data. Likert scales are very useful in measuring the degree of agreement or disagreement on an issue, and provide answers in the form of coded data that can be easily analyzed and compared (Alreck, 1995:116-117). Ranking skills based on mean scores, as derived by using a Likert scale, was used by Young and Lee (1997); Trauth et al (1995) and (1993); Lewis et al (1995) and Leitheiser (1992).

Part IV and V of the survey dealt with the primary source of training that was used or should be used in order to gain successful skill levels in each of the three major categories. Part IV repeated the 24 skills and asked the participants to indicate the primary source of training they used to gain knowledge and understanding in each of the critical skills areas. Part V repeated the 24 skills and asked where the commanders expect the member's of their organization to receive IRM training. This part seeks to understand how commanders are handling the issue of training of their junior officers in IRM tasks and functions. It also represents to what degree commanders rely on a particular source of training over another.

Part VI was intended for participants to add comments and offer suggestions that they felt were important to this research project. This section adds value to the study since commanders' thoughts and ideas are regarded highly and taken very seriously in the Air Force.

Although Schmidt validated the instrument for this study, two professors of the AFIT Graduate School of Logistics Management were consulted in the design of the modifications made to the original survey to capture commanders' perceptions. Per AFI 36- 2601, Air Force Personnel Survey Program, the survey was approved by AFPC

Survey Branch and was issued a survey control number (SCN 98-22) prior to release to the population.

Survey Administration

Survey packages were mailed out to all of the 210 commanders on 1 April 98 with a requested response date of 30 April 98. It was decided that 30 days provided adequate time for responses. Each survey package contained the survey, a cover letter describing the purpose of the study, and a pre-addresses return envelop to make it easy for participants to return the survey. There were 130 surveys returned and analyzed for this study. The following table shows a break down of respondents.

**Table 5. Survey Respondents by Rank**

| 33SX RANK DISTRIBUTION OF SURVEYS | | |
|---|---|---|
| | **Sent** | **Responded** |
| LtCol | 93 | 63 |
| Major | 73 | 42 |
| Captain | 22 | 13 |
| 1st Lt | 10 | 7 |
| 2nd Lt | 12 | 5 |
| Total | 210 | 130 |

**Data Analysis Procedures**

Answers were annotated, and a spreadsheet was built in Microsoft Excel for summarization. In addition to the tests done on the command group, comparison tests were done to relate those responses of commanders to those of junior officers.

The demographic information was analyzed through descriptive statistics to disclose the classification of the respondents.

Parts II and III of the survey analyzed and ranked the 24 skills for importance to the IRM mission by computing the mean score based on the individual responses (Schmidt, 1997:48). The skills were then analyzed by skill categories: technical, managerial and interpersonal.

Parts IV and V of the survey used frequencies to determine how many times a training source was selected as the primary source of training or expected source of training for each of the 24 skills.

Finally, Part VI of the survey gathers comments and thoughts from the commanders and is presented using general themes found through the surveys.

**Summary**

The methodology used in this study includes survey design and information collection through this survey and data analysis using descriptive statistics. Modifications made to the original survey are intended to capture important relevant data from commanders as this population differs from the previously surveyed population of junior officers. It is hoped that information gathered from both populations will contribute to the growth and development of the recently formed Communications–Information career field.

# IV - Data Analysis

## Introduction

The purpose of this thesis and the research conducted for it was to identify the perceptions of 33Sx commanders concerning the core skills required to perform the IRM mission successfully. The research questions to be answered by the questionnaire were:

1. What IRM skills do commanders in the field perceive as being most important in performing the IRM mission?

2. How well are these skills exhibited by members of the commander's organization according to commander perception?

3. Where do commanders expect their officers to receive training?

## Responses

A questionnaire consisting of 105 questions, divided into six sections, was administered to 210 Communication-Information commanders. Twelve surveys were returned unopened due to erroneous addresses or because the recipient had separated from the Air Force. Of the remaining 198 surveys, 130 were returned for a survey response rate of 65.7 percent. All returned surveys were determined usable.

The questionnaire solicited information pertaining to demographics, the core skills identified in the literature review, primary training sources and desired training sources. Part VI of the survey was an open section for any comments related to the

career field and the research. Many comments were received and several notable comments are presented later in this chapter.

This chapter will first present the demographic statistics of those whom participated in the study. Next, it presents the statistical analysis gathered from the data to answer the three research questions. Finally, representative qualitative comments from Part VI are discussed.

## Demographic Information

Part I of the questionnaire was designed to gather demographic information on the sample selected for the research. The section had nine questions to identify rank, time in service, AFSC, time in AFSC, education levels, and whether the respondent had attended BCOT, ACOT and/or Scope Eagle.

Rank. As indicated in the following table, almost half of the respondents were Lieutenant Colonels. The next largest group was Majors as expected, followed by Captains. Colonels were omitted from the pool of commanders at the request of Air Force Personnel Center (AFPC). A small portion of the commanders surveyed held the rank of Lieutenant. It is reasonable to assume that these Lieutenants and perhaps some of the Captains were flight commanders and not squadron commanders. Over 80 percent of commanders surveyed were either Lieutenant Colonels or Majors which is to be expected and desired when surveying commanders. The following table depicts the breakdown.

**Table 6. Rank Distribution of Respondents**

| 33SX RANK DISTRIBUTION | | |
|---|---|---|
| LtCol | 63 | 48.46% |
| Major | 42 | 32.31% |
| Captain | 13 | 10.00% |
| 1st Lt | 7 | 5.38% |
| 2nd Lt | 5 | 3.85% |
| Total | 130 | 100% |

Time in service. The following table shows the time in service for each of the respondents. This information represents total time in the Air Force. No attempt was made to separate noncommissioned years and commissioned years of service. Most of the commanders, 76 percent, have been in the service over 14 years. This is not surprising since it typically takes that long to earn the position of commander. This is important to note because it suggests that the majority of the respondents are well beyond the initial training years and are formed as 33Sx officers. They have had ample time in the field for experience and growth and can make educated judgements on what it takes to be successful in their career field. The remaining 24 percent have mostly finished their initial training phases and their perceptions can also add value to the study.

**Table 7. Time in Service**

| Time in Service (in years) | | |
|---|---|---|
| Less than 2 | 4 | 3.08% |
| 2 to 4 | 6 | 4.62% |
| 4 to 8 | 5 | 3.83% |
| 8 to 11 | 5 | 3.83% |
| 11 to 14 | 11 | 8.46% |
| 14 to 17 | 33 | 25.38% |
| 17 to 20 | 30 | 23.08% |
| 20 to 23 | 23 | 17.69% |
| More than 23 | 13 | 10.00% |
| Total | 130 | 100% |

Current Air Force Specialty Code (AFSC). The majority, 54 percent, of the respondents indicated a primary AFSC of 33S3. Next was 33S4 followed by *other* and then 33S1. The fifteen (12 percent) who responded with *other* were for two reasons. First, ten out of the fifteen labeled their AFSC in the space provided with C33S3/4 which designates commander. This option was not considered and determined unnecessary when designing the survey since the survey was only given to commanders. However, some felt it was important to specify. The other reason for an *other* response was due to other designators such as *T* or *J*. Only one response actually had a different primary AFSC outside of the Communications-Information career field.

**Table 8. Air Force Specialty Code**

| Air Force Specialty Code | | |
|---|---|---|
| 33S1 | 6 | 4.62% |
| 33S3 | 70 | 53.85% |
| 33S4 | 39 | 30.00% |
| Other | 15 | 11.54% |
| Total | 130 | 100% |

Years in current AFSC. This table identifies years in current AFSC for the respondents. There is an obvious majority group, 60 percent, of more than six years. This reveals that most of those surveyed have been in their career field their entire Air Force tenure. The next largest group is those with three or less years in current AFSC. This data may mean that many of them are crossflows from the old IM career field. However, since there was confusion about AFSC with the commander designator *C* prefix, it maybe reasonable to assume that what was meant was how long they have been a commander. Unfortunately, the confusion from the AFSC may be the reason for this ambiguity.

**Table 9. Years in Current AFSC**

| Years in Current AFSC | | |
|---|---|---|
| less than 1 | 12 | 9.23% |
| 1 to 2 | 17 | 13.08% |
| 2 to 3 | 13 | 10.00% |
| 3 to 4 | 5 | 3.85% |
| 4 to 5 | 3 | 2.31% |
| 5 to 6 | 2 | 1.54% |
| more than 6 | 78 | 60.00% |
| Total | 130 | 100% |

Shreadout. A shreadout is a suffix attached to an AFSC which identifies a specific area of expertise within that AFSC. The 33Sx AFSC has three shreadouts as shown in the following table. According to the data, the majority of respondents, 64 percent, do not have shreadouts implying that they are regular or generic 33Sx officers.

**Table 10. 33SX Shreadouts**

| Shreadouts | | |
|---|---|---|
| A, Electrical Engineer | 10 | 7.69% |
| B, Software Engineer | 2 | 1.54% |
| C, Programmer/Analyst | 8 | 6.15% |
| No Shreadout | 83 | 63.85% |
| AFSC not 33S1/3 | 27 | 20.77% |
| Total | 130 | 100% |

Education. The highest level of education by each participant was also gathered. The table below clearly shows that the majority, 86 percent, of respondents have completed a Master's Degree. This is important to note because most of the survey participants have had both undergraduate and graduate experiences and can make an educated judgement on where future training, formal or in-formal, for this career field should come from.

**Table 11. Education Level Attained**

| Education Level | | |
|---|---|---|
| Bachelor's Degree | 8 | 6.15% |
| Master's courses | 7 | 5.34% |
| Master's Degree | 112 | 86.15% |
| PhD courses | 3 | 2.31% |
| PhD | 0 | 0.00% |
| Total | 130 | 100% |

Basic Communication Officer Training (BCOT). The questionnaire also asked who had participated in formal technical Air Force training. BCOT is the Basic Communications Officers Training typically attended by 33Sx officers within the first two years of service. However, in the 1980s, it was found to have been waived for those officers who had Computer Science Bachelor's Degrees. The table indicates that 72 percent of the commanders have attended BCOT, but does not determine how many might have fallen into the category which were waived. For several remarks by commanders regarding BCOT, refer to the comments portion of this chapter.

**Table 12. BCOT Attendance**

| BCOT Attendance | | |
|---|---|---|
| Yes | 93 | 71.54% |
| No | 37 | 28.46% |
| Total | 130 | 100% |

Advanced Communications Officer Training (ACOT). The advanced course is offered to 33Sx officers who have been in the career field approximately seven years. It is typically attended by Majors. Most of the respondents have attended this training, 64 percent.

**Table 13. ACOT Attendance**

| ACOT Attendance | | |
|---|---|---|
| Yes | 83 | 63.85% |
| No | 47 | 36.15% |
| Total | 130 | 100% |

Scope Eagle. Scope Eagle is a five day capstone professional development course for the Communications-Information career field. It provides an opportunity for senior executives to discuss corporate policies and issues and refresh themselves technically (ACOT home page). The majority, 71 percent, of 33SX commanders have not attended the Scope Eagle training. The comments provided by the respondents revealed that many respondents have not even heard of Scope Eagle. This is important because it may indicate that policies and training programs may not be marketed properly or that there may not be a clear career progression path for officers to follow.

**Table 14. Scope Eagle Attendance**

| Scope Eagle Attendance | | |
|---|---|---|
| Yes | 38 | 29.23% |
| No | 92 | 70.77% |
| Total | 130 | 100% |

**Summary of Demographic Information**

Demographic information is very useful in creating a profile of survey participants. In this survey, the typical respondent was a Lieutenant Colonel possessing the 33Sx AFSC without a shreadout, with more than 14 years in service, more than 6 years in the current AFSC and having completed a Master's degree. In regards to formal Air Force training, 72 percent of the respondents had attended the entry-level training,

BCOT, and 64 percent had attended the advanced level training, ACOT. The majority of commanders, 71 percent, had not attended Scope Eagle.

**Questionnaire Results**

**Part II – Critical IRM Skills.**

Section two of the survey was intended to determine which IRM skills commanders in the field perceive as being the most important to successfully perform the IRM mission. The skills were derived from the literature and the commanders were asked to rate their importance based on a five-point Likert scale. The anchors on the scale ranged from 1, the skill is not important; to 5, the skill is extremely important to IRM. Based on the Likert scale and the responses received, 14 of the 24 skills (58 percent) were identified as being *very important*; a mean score of 4.0 or higher. Four skills were identified as being *moderately important* with means between 3.177 and 3.954; and six skills were identified as being *slightly important* with means between 2.310 and 2.977. "Ability to work closely with customers and maintain a productive user or client relationship" had the highest mean score, 4.715. Four of the top five skills belonged to the interpersonal skill group, while the technical skill group had the lowest seven mean scores. The skill with the lowest mean score was "expert systems/artificial intelligence" which had a mean score of 2.310. The following table shows the ranking of the 24 skills seen as most important to commanders based on their mean score. The table headings include:

Rank: The skills are listed in descending order of importance as determined by the mean scores computed from the responses received from the participating officers.

Mean: The mean score for each skill was derived by averaging the responses from each survey. According to the Likert scale used, the closer the mean value is to 5, the more important the skill is in performing IRM functions, based on the perceptions of the commanders surveyed.

Standard Deviation: The standard deviation is a measure of the spread in the distribution of the data. The larger the standard deviation, the more variances between the individual data item and the mean score of the data set.

Min/Max: The minimum and the maximum measurements chosen by the respondents for that particular skill.

Group: The skill category is shown as derived from the literature representing three groups: interpersonal skills (I); managerial skills (M); and technical skills (T).

Question number and skill: The question number is given for easy referral to the survey and the actual skill as worded in the survey is given for comprehension of ratings.

**Table 15. Core IRM Skills According to Commanders Ranked by Mean Score**

| Rank | Mean | Stnd Dev | Min/Max | Group | quest # | Core Skill |
|---|---|---|---|---|---|---|
| 1 | 4.715 | 0.600 | 2/5 | I | 29 | Ability to work closely with customers and maintain a productive user or client relationship |
| 2 | 4.685 | 0.529 | 3/5 | I | 32 | Ability to write clearly, succinctly, and purposefully |
| 3 | 4.677 | 0.587 | 2/5 | I | 33 | Ability to communicate verbally, one-on-one and group briefings |
| 4 | 4.608 | 0.577 | 3/5 | M | 22 | Ability to learn and implement new technologies |
| 5 | 4.608 | 0.564 | 2/5 | I | 31 | Ability to plan, organize, and lead projects (project management) |
| 6 | 4.569 | 0.570 | 3/5 | M | 23 | Ability to understand technological trends and potentials |
| 7 | 4.554 | 0.598 | 3/5 | T | 11 | Networks (LAN, WAN, Corporate-wide, etc.) |
| 8 | 4.485 | 0.673 | 2/5 | M | 25 | Information and System Security |
| 9 | 4.292 | 0.741 | 2/5 | M | 24 | Ability to plan and set standards for corporate-wide information systems technology plan |
| 10 | 4.192 | 0.705 | 2/5 | T | 10 | Telecommunications (hardware, phones, modems, cables, satellites, etc.) |
| 11 | 4.177 | 0.867 | 2/5 | T | 21 | Office automation (e-mail, schedulers, etc.) |
| 12 | 4.062 | 0.755 | 2/5 | I | 30 | Ability to train/teach others to include end-users |
| 13 | 4.054 | 1.029 | 1/5 | M | 28 | Ability to interpret and solve business problems |
| 14 | 4.000 | 0.726 | 2/5 | M | 26 | Contingency planning/disaster recovery |
| 15 | 3.954 | 0.852 | 1/5 | T | 12 | Systems integration |
| 16 | 3.415 | 0.947 | 1/5 | T | 14 | Systems life cycle management |
| 17 | 3.392 | 0.902 | 1/5 | M | 27 | Establish/monitor corporate data structure |
| 18 | 3.177 | 1.015 | 1/5 | T | 20 | Operating systems for mainframe, minis, micros, networks |
| 19 | 2.977 | 0.902 | 1/5 | T | 13 | Systems analysis/structured analysis (formal method) |
| 20 | 2.808 | 0.881 | 1/5 | T | 16 | Distributed processing |
| 21 | 2.690 | 0.925 | 1/5 | T | 18 | Decision support systems |
| 22 | 2.677 | 0.934 | 1/5 | T | 15 | Relational databases |
| 23 | 2.339 | 0.822 | 1/5 | T | 17 | CASE methods or tools |
| 24 | 2.310 | 0.827 | 1/4 | T | 19 | Expert systems/artificial intelligence |

This method of ranking skills based on mean scores using a Likert scale was used in previously mentioned studies by Young and Lee, 1997, Trauth, et al, 1995 and 1993, Lewis, et al, 1995, and Leitheiser, 1992 (Schmidt, 1997:62). According to the data, the interpersonal skill category has the highest aggregated mean score, 4.549. Next is the managerial skill category, followed by the technical skills category. Current literature indicated that interpersonal skills were indeed the most important skill set in the IRM profession and this study concurs. The following table and graph depict the three skill groups by aggregate mean score.

**Table 16. Aggregate Mean Scores by Skill Group**

| Aggregate Mean Scores | |
|---|---|
| Interpersonal Skills (IPS) | 4.549 |
| Managerial Skills (MS) | 4.200 |
| Technical Skills (TS) | 3.273 |

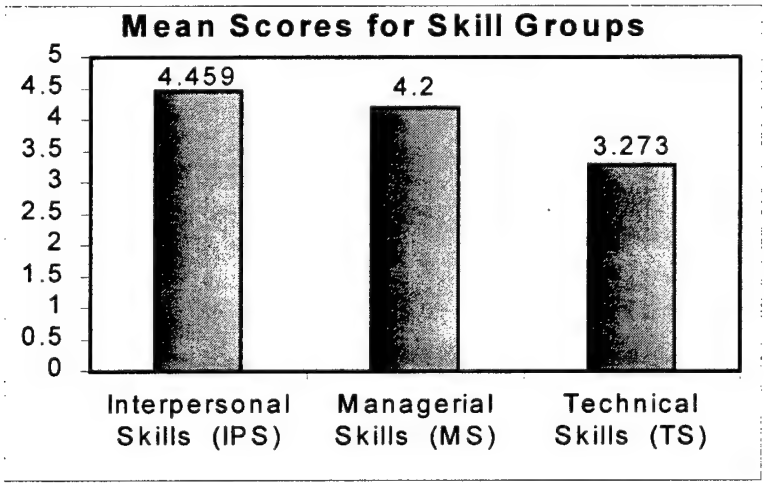



**Figure 2. Mean Scores for Skill Groups**

An ANOVA test determined the significance between the skills. Interpersonal are more significant than managerial and technical skills, and managerial are more significant that technical skills as depicted in the following table.

**Table 17. ANOVA Test for Significance**

SUMMARY

| *Groups* | *Count* | *Sum* | *Average* | *Variance* |
|---|---|---|---|---|
| Interpersonal skills | 650 | 2957 | 4.549231 | 0.432858 |
| Managerial skills | 910 | 3822 | 4.2 | 0.734433 |

ANOVA

| *Source of Variation* | *SS* | *df* | *MS* | *F* | *P-value* | *F crit* |
|---|---|---|---|---|---|---|
| Between Groups | 46.243 | 1 | 46.24397 | 75.95808 | 7.27E-18 | 3.847433 |
| Within Groups | 948.52 | 1558 | 0.608809 | | | |
| Total | 994.76 | 1559 | | | | |

SUMMARY

| *Groups* | *Count* | *Sum* | *Average* | *Variance* |
|---|---|---|---|---|
| Managerial skills | 910 | 3822 | 4.2 | 0.734433 |
| Technical skills | 1558 | 5100 | 3.273427 | 1.289351 |

ANOVA

| *Source of Variation* | *SS* | *df* | *MS* | *F* | *P-value* | *F crit* |
|---|---|---|---|---|---|---|
| Between Groups | 493.19 | 1 | 493.1994 | 454.6449 | 1E-92 | 3.84523 |
| Within Groups | 2675.1 | 2466 | 1.084801 | | | |
| Total | 3168.3 | 2467 | | | | |

SUMMARY

| *Groups* | *Count* | *Sum* | *Average* | *Variance* |
|---|---|---|---|---|
| technical skills | 1558 | 5100 | 3.273427 | 1.289351 |
| interpersonal skills | 650 | 2957 | 4.549231 | 0.432858 |

ANOVA

| *Source of Variation* | *SS* | *df* | *MS* | *F* | *P-value* | *F crit* |
|---|---|---|---|---|---|---|
| Between Groups | 746.53 | 1 | 746.5333 | 719.6384 | 1.9E-137 | 3.845685 |
| Within Groups | 2288.4 | 2206 | 1.037373 | | | |
| Total | 3034.9 | 2207 | | | | |

**Summary – Part II.**

In this section of chapter IV, part II of the questionnaire was discussed. The commanders that were surveyed perceive the skill "ability to work closely with customers and maintain a productive user or client relationship" as the most important skill from the list of 24 skills. Commanders perceived the interpersonal skills group to be the most important with four of the top five skills belonging to this category. Managerial skills were ranked second and technical skills were ranked last. These findings not only concur with current literature regarding the order of importance for these three skills categories, they also match the results found in Schmidt (1997), including the single most important skill, ability to work closely with customers and maintain a productive user or client relationship, and least important skill, expert systems/artificial intelligence. This is significant even though all the rankings weren't the same, because it suggests that junior officers and commanders have similar thoughts as to what makes an IRM professional successful.

**Part III – Skills of the Organization.**

Part III of the questionnaire was designed to answer the research question, "How well are these skills exhibited by members of the commander's organization according to commander perception?" This section asked the commanders to rate their squadron members, using a five-point Likert scale again, on how well skilled they are to perform the critical skills as listed in the survey. The anchors on the scale ranged from 1, not at all skilled; to 5, extremely skilled. Based on this Likert scale and the responses received, 13 of the 24, (54 percent), were identified as being *moderately skilled*, a mean score of

3.0 or higher. The range of these mean scores were from 3.116 to 3.952, meaning that there were no ratings, although close, of *highly skilled*; a mean over 4.0; or *extremely skilled*; a mean over 5.0. There were seven skills with slightly lower mean scores between *somewhat skilled* and *moderately skilled* with mean scores ranging from 2.348 to 2.984, and four skills rated between *not at all skilled* and *somewhat skilled* with ranges from 1.534 to 1.930. Again, the skill "ability to work closely with customers and maintain a productive user or client relationship" had the highest mean score, 3.952. The skill with lowest mean score was once again "expert systems/artificial intelligence" which had a mean score of 1.5340. It is interesting to note that although three out the top five skills belonged to the interpersonal skills group, the number two ranked skill was a technical skill, office automation. As one commander remarked in the comments section, "Although our new lieutenants are generally technically superior on small computers, they don't seem to know much about telecom, even after BCOT." Again, the technical skill group had the lowest seven mean scores. The following table shows the 24 skills as rated by the commanders concerning the organizations' members' skill levels. It is set up as previously described.

**Table 18. Core IRM Skill Levels of Commander's Organizational Members Ranked by Mean Score**

| Rank | Mean | Stnd Dev | Min/Max | Group | quest # | Core Skill |
|---|---|---|---|---|---|---|
| 1 | 3.952 | 0.854 | 2/5 | I | 53 | Ability to work closely with customers and maintain a productive user or client relationship |
| 2 | 3.800 | 0.803 | 2/5 | T | 45 | Office automation (e-mail, schedulers, etc.) |
| 3 | 3.740 | 0.798 | 1/5 | M | 46 | Ability to learn and implement new technologies |
| 4 | 3.696 | 0.835 | 1/5 | I | 57 | Ability to communicate verbally, one-on-one and group briefings |
| 5 | 3.626 | 0.900 | 1/5 | I | 55 | Ability to plan, organize, and lead projects (project management) |
| 6 | 3.602 | 0.885 | 1/5 | M | 47 | Ability to understand technological trends and potentials |
| 7 | 3.557 | 0.799 | 2/5 | I | 54 | Ability to train/teach others to include end-users |
| 8 | 3.480 | 0.876 | 1/5 | I | 56 | Ability to write clearly, succinctly, and purposefully |
| 9 | 3.295 | 0.959 | 1/5 | M | 52 | Ability to interpret and solve business problems |
| 10 | 3.262 | 0.861 | 1/5 | T | 34 | Telecommunications (hardware, phones, modems, cables, satellites, etc.) |
| 11 | 3.207 | 0.930 | 1/5 | T | 35 | Networks (LAN, WAN, Corporate-wide, etc.) |
| 12 | 3.151 | 1.022 | 1/5 | M | 48 | Ability to plan and set standards for corporate-wide information systems technology plan |
| 13 | 3.116 | 0.942 | 1/5 | M | 49 | Information and System Security |
| 14 | 2.984 | 1.072 | 1/5 | M | 50 | Contingency planning/disaster recovery |
| 15 | 2.819 | 0.992 | 1/5 | T | 36 | Systems integration |
| 16 | 2.754 | 1.012 | 1/5 | T | 44 | Operating systems for mainframe, minis, micros, networks |
| 17 | 2.598 | 1.099 | 1/5 | M | 51 | Establish/monitor corporate data structure |
| 18 | 2.444 | 0.993 | 1/5 | T | 38 | Systems life cycle management |
| 19 | 2.360 | 1.049 | 1/5 | T | 37 | Systems analysis/structured analysis (formal method) |
| 20 | 2.348 | 2.261 | 1/2 | T | 40 | Distributed processing |
| 21 | 1.930 | 0.948 | 1/5 | T | 39 | Relational databases |
| 22 | 1.838 | 0.932 | 1/5 | T | 42 | Decision support systems |
| 23 | 1.683 | 0.906 | 1/5 | T | 41 | CASE methods or tools |
| 24 | 1.534 | 0.790 | 1/5 | T | 43 | Expert systems/artificial intelligence |

Commanders seemed to have given credit to their organizations' member's managerial skills. Though they generally said that their members had better interpersonal skills than managerial and technical skills, they significantly rated their managerial skills higher than most of their technical skills. However, if the importance is not placed very high on the technical skills than it is understandable that the members would not place as high an emphasis on developing these technical skills. This information is important for junior officers to understand where their commanders might place more emphasis on performance. It also illustrates where commanders might be frustrated with the skills of their junior officers in some situations.

The following table and chart illustrate the aggregate mean scores of the organizations' skills as perceived by the commanders.

**Table 19. Aggregate Mean Scores of Organizations' Skills as Perceived by Commanders**

| Aggregate Mean Scores | |
|---|---|
| Interpersonal Skills (IPS) | 3.662 |
| Managerial Skills (MS) | 3.217 |
| Technical Skills (TS) | 2.514 |

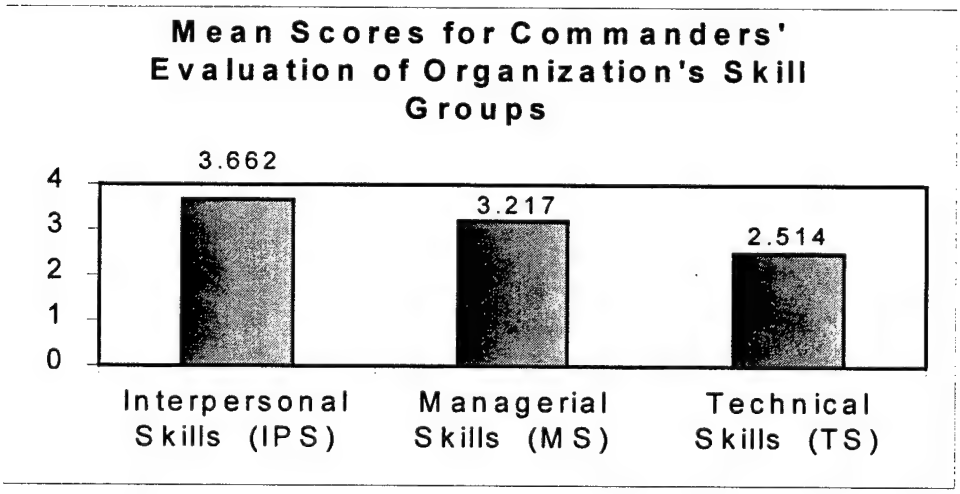



**Figure 3. Mean Scores of Organization's Skill Groups**

Again, using an ANOVA analysis, the significance of the difference between skills can be shown.

**Table 20. ANOVA Test for Significance**

SUMMARY

| *Groups* | *Count* | *Sum* | *Average* | *Variance* |
|---|---|---|---|---|
| interpersonal skills | 621 | 2274 | 3.661836 | 0.749977 |
| managerial skills | 846 | 2722 | 3.217494 | 1.0627 |

ANOVA

| *Source of Variation* | *SS* | *df* | *MS* | *F* | *P-value* | *F crit* |
|---|---|---|---|---|---|---|
| Between Groups | 70.7075 | 1 | 70.70757 | 76.00083 | 7.54E-18 | 3.847816 |
| Within Groups | 1362.96 | 1465 | 0.930353 | | | |
| Total | 1433.67 | 1466 | | | | |

SUMMARY

| *Groups* | *Count* | *Sum* | *Average* | *Variance* |
|---|---|---|---|---|
| managerial skills | 846 | 2722 | 3.217494 | 1.0627 |
| technical skills | 1369 | 3442 | 2.514244 | 1.327465 |

ANOVA

| *Source of Variation* | *SS* | *df* | *MS* | *F* | *P-value* | *F crit* |
|---|---|---|---|---|---|---|
| Between Groups | 258.594 | 1 | 258.5948 | 210.8622 | 1.05E-45 | 3.845656 |
| Within Groups | 2713.95 | 2213 | 1.226368 | | | |
| Total | 2972.54 | 2214 | | | | |

SUMMARY

| *Groups* | *Count* | *Sum* | *Average* | *Variance* |
|---|---|---|---|---|
| technical skills | 1369 | 3442 | 2.514244 | 1.327465 |
| interpersonal skills | 621 | 2274 | 3.661836 | 0.749977 |

ANOVA

| *Source of Variation* | *SS* | *df* | *MS* | *F* | *P-value* | *F crit* |
|---|---|---|---|---|---|---|
| Between Groups | 562.622 | 1 | 562.6221 | 490.361 | 2.69E-97 | 3.846139 |
| Within Groups | 2280.95 | 1988 | 1.147363 | | | |
| Total | 2843.58 | 1989 | | | | |

**Summary - Part III.**

In this section of chapter IV, part III of the questionnaire was discussed. The commanders that were surveyed perceive their members best skill to be "ability to work closely with customers and maintain a productive user or client relationship". Commanders generally perceive their members to be best at interpersonal skills, then managerial and then technical skills. However, additional skills from both the managerial and technical domains were considered very important as well.

**Part IV – Primary Source of IRM Training for Commanders.**

Part IV of the questionnaire was designed to answer the research question, "what was the primary source of any IRM training the commander him/her self has received?" It is to be expected that many sources aided in learning knowledge and skills in the IRM field however, the commanders were asked to choose one primary source of training from the list of eight possible choices of where they received their training in each of the skills. The choices of primary training sources the commanders had to choose from were (1) no training in this area, (2) self-taught, (3) on the job training (Air Force), (4) correspondence courses, (5) Air Force technical training program, (6) undergraduate degree program, (7) master's degree program, and (8) other. Of these eight items, correspondence courses, Air Force technical training program, undergraduate degree program and master's degree program are considered to be formal methods of training while the rest are considered informal methods.

For each of the skills, the commanders were asked to identify, from the list, the primary source where he/she received training for that particular skill. The most

frequent overall source of training identified by the commanders for their own training skills was *on-the-job training*, an informal method. The next overall highest response received was *no training in this area*, followed by training from *Master's degree program*, a formal method of training. Breaking it down by skill category, commanders appear to have gained their interpersonal, managerial, and technical skills from *on-the-job training*. Many also admit to having had *no training in an area*. The graphs below depict the break down by skill category.

**Table 21. Training Sources**

| Commanders' Training Sources |
|---|
| **1** No training in this area |
| **2** Self-taught |
| **3** On the job training (Air Force) |
| **4** Correspondence courses |
| **5** Air Force technical training programs |
| **6** Undergraduate degree program |
| **7** Master's degree program |
| **8** Other |

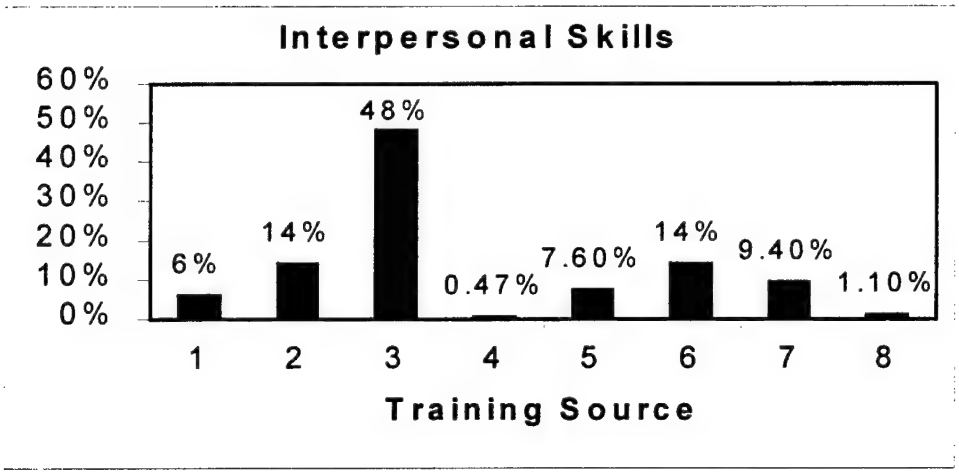



**Figure 4. Commanders' Interpersonal Skills Training Sources**

Commanders received most of their interpersonal skills training through *on-the-job training*. It is important to note here and for future reference, that *on-the-job training*

and *self-taught* may actually have some overlap. One commander's comments reflected such a combination: "I have found that throughout my career on-the-job-training does mean teach yourself. As officers we do not have the checklists that the enlisted corps has for OJT." Another comment emphasizes why *self-taught* was a fairly common response: "Self-taught is the key concept in the information age."

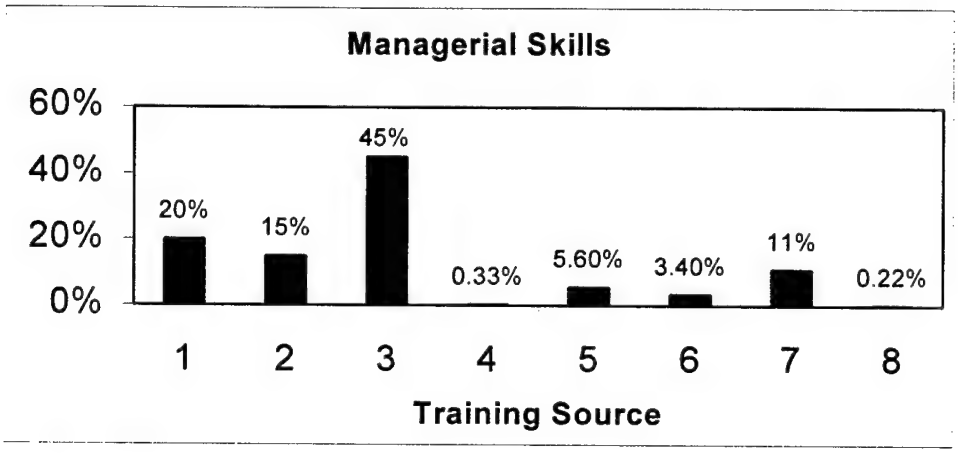



**Figure 5. Commanders' Managerial Skills Training Sources**

In both managerial and technical skill areas for commanders *on-the-job-training* was the highest. Also the same percentage (28 percent) in technical skills received the *no training in this area* response.

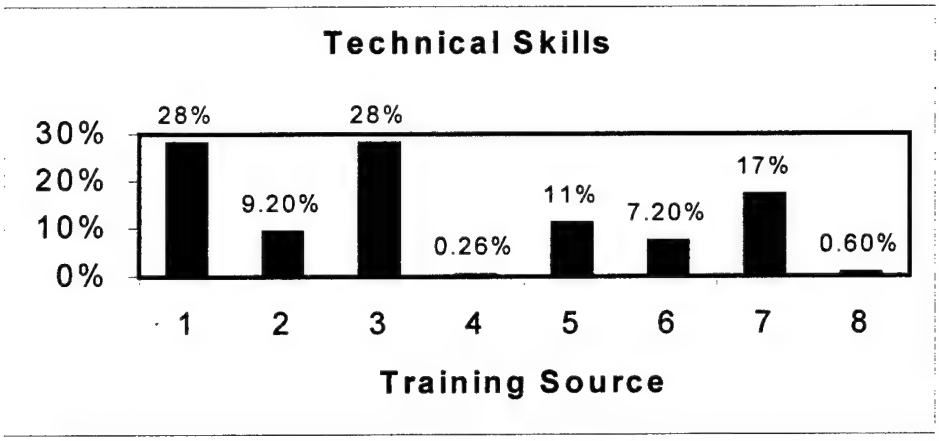



**Figure 6. Commander's Technical Skills Training Sources**

**Summary – Part IV.**

This section polled commanders as to where they received their training in the three skill areas. The majority answered they had learned their skills through on-the-job training in a sink or swim situation. The effectiveness of this on-the-job-training is not measured here but would be helpful in determining ideal sources of training. It is interesting to note that commanders predominantly received knowledge about a certain skill through non-formal means and not formal means. Within the technical skills, there was an equal amount of responses of no training in the area. This is perhaps due to the speed with which technology advances. Also commanders immediate responsibilities tend to be more managerial in nature than technical.

**Part V – Desired Source of IRM Training for Organization by Commanders**

This section of the survey asked commanders if they could have their organizations trained ideally, which training sources would they prefer. The survey

revealed they would utilize the *Air Force technical programs* predominantly, followed by *on-the-job-training*, and then by *undergraduate degree programs*. The following graphs portray where commanders would like to see their organizations gain knowledge according to skill category.

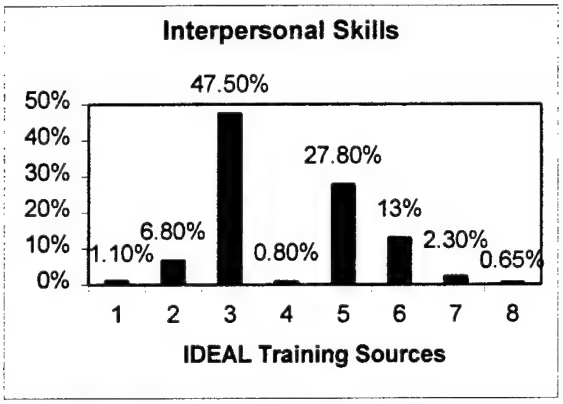



**Figure 7. Ideal Source of Interpersonal Skills Training**

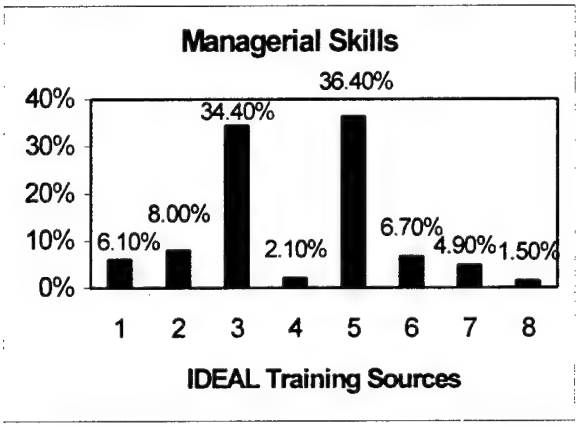



**Figure 8. Ideal Source of Managerial Skills Training**

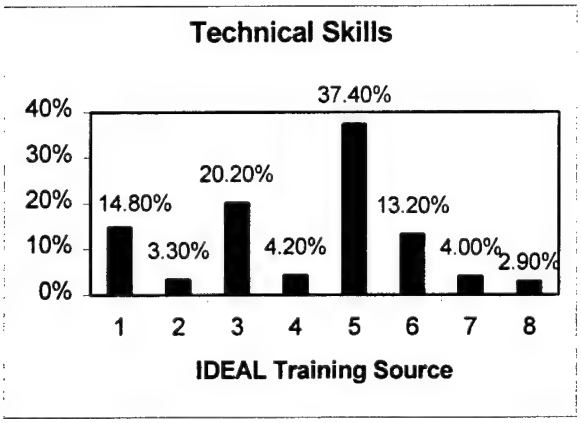



**Figure 9. Ideal Source of Technical Skills Training**

The responses reveal that commanders would like to rely heavily on the Air Force to train their organization's members through Air Force technical training, such as BCOT and ACOT, and other short training courses. The commanders recognize, however, that this is the ideal and that reality has a lot to live up to. Several comments mentioned that Air Force technical training classes were not very useful: "Air Force courses (tech schools, correspondence) should be the primary source of training, however, it is hard to get slots in these courses and they are seldom current enough or in-depth enough." One commander addresses technical training realities: "BCOT and ACOT are, in my opinion, a complete waste of time. The tools needed are all available on the open market. The key is to provide the training as they need it, then put them into a position to use it." "The Air Force currently expects comm and info officers to learn too much via OJT and/or osmosis. We have reduced the C and I technical training too much. We need longer courses that teach more." Additional comments regarding Air Force technical training can be found in Appendix C.

**Summary – Part V.**

Data was collected to find out what training sources commanders would choose if they could pick the ideal training environment. For interpersonal and managerial skills, most commanders felt that on-the-job-training would be ideal. For technical skills, most felt that Air Force technical training would be better. However, it is noted that many commanders are not satisfied with the Air Force technical training as it exists today. "Training is the number one area we can improve on to directly effect our productivity, yet it is usually shoved to the side. I would love to provide user application training or

LAN administration training but do not have the manpower available. The latest AF CBT proposal was a great step in the right direction."

**Part VI. – Comments.**

Part VI of the questionnaire was an open section for the commanders to explain answers or to comment on the IRM issues within the Air Force or in this research. Of the 130 surveys returned, all but 34 surveys contained comments. It is clear that commanders are concerned and interested in the issues facing their career field from these comments. Many of the comments were concerned about the source of training and the ability to keep up with technological advances. There were three general themes concluded from these comments. First, technology changes too fast to keep up with so it is imperative to make the best use of sources of training. This was repeated over and over again. One commander said: "Wish we had time to train all our folks on this stuff, but not in today's high ops-tempo Air Force. It's mostly OJT, self-taught (survival) type training. With the Comm community dwindling down their people and services the units, (every Joe Schmoe) is forced to try to learn this stuff to keep things working. This is on top of learning their actual jobs." Another comment stated: "Technological changes are happening a great deal faster than the ability of our Air Force to keep pace. The result is more reliance on on-the-job training and commercially procured training." The rapid changes with technology is a concern that industry, as well as the Air Force, must contend with, but according to some of the comments, it might appear that industry is leading the way. "The best training available today is from commercial sources. These courses offer current information on the latest technological developments. Unfortunately, they do not always directly relate to our Air Force programs."

The second major theme that could be gleaned from the comments was the move towards outsourcing and contracting out different aspects of the Communication-Information career field training. As stated earlier, several commanders did not feel that BCOT and ACOT were adequate training sources as they currently exist. This is consistent with the comments gathered in Schmidt (1997).

Finally, the last theme focused on particular skill areas that desperately need attention. These comments reflect the predominantly mentioned skill areas that are lacking according to commanders. "Technically knowledge regarding electronics is lacking. Many of our officers are expected to know how things work in addition to the basic operation of systems." "Networking skills are desperately needed. I recommend we re-compile Air Force formal training to ride industry's coat tails." "Many of the areas that are hurting us in Project Management, BPR, and life-cycle management. Good technicians are working on projects for years that are failing or being written off prior to implementation. There does not seem to be a readily accessible source for the skills we need to correct this trend at the base or MAJCOM level." More comments representing these themes can be found in Appendix D.

**Chapter IV – Summary**

Chapter IV presented the data as received by the questionnaires. The demographic make-up of the survey respondents was first described. Next, the data provided from Part II and III concerning skill importance was analyzed and presented. Ranked listings of the skills were presented for easy understanding of which skills commanders determined as most important to conduct the IRM mission in the Air Force.

The interpersonal skills group was considered the most vital skill group, followed by managerial and then technical. This finding concurs with the literature.

Then, the primary source of training used by the commanders to gain their skills was analyzed followed up with data presenting where commanders feel their organization's primary sources of training today should be ideally. There was a major difference in how the commanders themselves learned their skills and how they would like their organizations' members to learn them. Commanders felt that Air Force technical schools should be the primary source of training but, according to many of the comments, commanders feel those sources presently are not adequate.

Finally the chapter examined three general themes of thought from today's Communication – Information commanders. This chapter presented the data that was collected through the questionnaire. In the next chapter an interpretation of the meaning of this data will be provided.

# V – Discussion

More than 346,000 IT jobs remain unfilled because of a lack of skilled workers, according to a 1998 study by the Information Technology Association of America (ITAA). In the next decade, the United States Labor Department estimates that another 1.3 million workers will be needed to fill new high tech jobs (King 1998:1). The 1990s have witnessed a growing need for computer-related technological and managerial skills world-wide, and this trend is only expected to increase. With the explosive growth of this innovative age, it is safe to say that the concept of information as a strategic resource has been accepted.

This study aimed at adding to the Air Force literature regarding the Communication-Information career field a view of commanders' perceptions about the current IRM situation at the squadron levels. This chapter discusses conclusions made about the investigative questions through the research conducted. Recommendations related to IRM and the Air Force are also made and areas for future research are suggested.

## Conclusions

This research intended first, to discover what IRM skills commanders in the Communication-Information field perceive as being most important in performing the IRM mission. The IRM literature found that three major categories of skills were needed: interpersonal, managerial and technical. The skill categories found by commanders to be the most important are consistent with Schmidt (1997).

Overall, commanders judged the interpersonal skill category as the most important, with the highest of those skills being *ability to work closely with customers and maintain a productive user client relationship.* Next, was the managerial skills category, with the specific skill *ability to learn and implement new technologies* ranked as the highest, followed by the technical skills category with the highest ranked skill concerning *networks (LAN, WAN Corporate-wide, etc.).*

The very nature of an officer's job in the Air Force makes these results seem fitting. An officer is often considered more of a manager than a technical expert. Thus, it is necessary to have good interpersonal skills in order to properly communicate as a leader and manager. Simkin (1996) states "Organizational efficiencies are often best achieved by those individuals who can articulate organizational goals well, or can best explain to others how to reach those goals". Expertise in technical skills is, of course, beneficial and preferred but according to commanders, perhaps not absolutely necessary. It can be inferred that commanders feel that proficient interpersonal and managerial skills are essential to being an effective officer.

Second, this study sought to find out how well these skills were exhibited by members of the commander's organization according to commander perception. It was found that commanders typically thought the area lacking most in their organizations was the technical skills category. Members were generally rated as having very high interpersonal skills. However, commanders generally rated their members' managerial and technical skills more deficient. This finding may be due to a combination of two factors. First, the Air Force does not actively recruit its officers by their educational degrees. This means that a large percentage of Communication-Information officers do

not have formal undergraduate or graduate degrees in computer or information related areas. Due to the Command, Control, Communications and Computers (SC) and Information Management (IM) merger, even more non-techincal officers are now found in this career field. The second potential explanation is that technology changes are so rapid it is difficult for training programs and individuals to keep up. The combination of few officers with the desired educational degrees and the swift pace of technology advancements is perhaps the reason officers are lacking in overall technical skills. It is possible that the Air Force needs to reexamine its recruitment and training policies in these areas.

The final investigative question this research intended to answer was where do commanders expect their officers to receive their interpersonal, managerial and technical training? In determining the sources of training, commanders were also asked how they gained training on particular skills to see if they would change the training source under ideal circumstances. Most of the commanders gained training through *on-the-job-training*, which was not considered a formal training source in this thesis since there is no official OJT program for any Air Force officers. Many answered *self-taught* as well. Combined, this was the largest area where commanders received their own training on the listed skills. The next most frequent response was *no training in this area*, which applied almost exclusively to the technical skills. This is most likely due to the nature of a commander's job and the age of most of these commanders. Commanders, like officers in general, are required to be more a manager than a technician. Technology has changed extensively since the commanders in this sample went through much of their training so

they have either had no training in certain types of technology or have taught themselves in order to be knowledgeable.

In contrast to how commanders are learning these skills, the ideal training source commanders overwhelmingly desired for their organization's members was Air Force technical training. They thought that short courses, including BCOT and ACOT, and current technical training classes are the most effective way to train. However, many noted that BCOT and ACOT as they existed now, were not well-equipped or viable options based on three factors. First, commanders noted that with less manpower and smaller budgets it is difficult and often impossible to send their officers away to training. Second, BCOT and ACOT were said to teach very broad, basic concepts with little depth in any specific area. Third, commanders believe that the Air Force can not stay apprised of current technologies and training methods for this field as well as its corporate counterparts. There was clear expression made for the improvement of these two particular courses.

If commanders feel that gaining training from technical courses throughout one's career is the best way to gain skills and keep pace with technology, then perhaps that also partially explains the reason technical skills were ranked lower than interpersonal and managerial skills (though they were still considered important).

**Recommendations**

The issues discussed thus far do not have simple answers. Based on the data gathered, it is imperative that Communications-Information officers become proactive in gaining the skills needed in their careers. Whether it is interpersonal, managerial or

technical skills, the most common way to earn them is by self-taught methods and practice. Because the Communication-Information career field is very broad, officers must decide which skills need the most effort for improvement for themselves based on their current job and commander or projected career path. Scholars Ginzberg and Baroudi note in their study MIS Careers – A Theoretical Perspective that in respect to IS career paths, the literature is not extensive and little is known about the career paths of IS professionals beyond their first jobs. "Perhaps the most that can be said about IS careers is that computer professionals tend to create their own career paths – often through multiple organization and only 'loosely-related computer positions'" (Simkin, 1996:70). Since the Air Force Communication-Information career field is relatively new, little can be confirmed to date regarding its career path. Officers can only make a best effort attempt to remain on top of their skills to advance in their careers.

One way for officers to gain and maintain their skills is to outline a continuing education plan by taking advantage of such means as Computer Based Training methods (CBTs), civilian or corporate offered courses, and regular study of up-to-date literature. "With the pace of technology, there is no way to avoid a heavy requirement for self-study. No formal training will ever replace the need to stay current individually", remarked one commander. However, in order to accomplish such a plan, not only must the officer be dedicated, the officer must have the support of bosses and commanders to afford the officer the time to accomplish the self-taught training. As one commander commented, "CBTs seem to be a great idea, but nobody has time to sit at their desk and take CBT courses while still on the job. We have too few people and too many fires to

put out." Somehow, there has to be a balance between current duties and investment in future proficiency.

Also based on the data gathered in this study, the Air Force as well must respond to the needs of the Communication-Information career field. There may be several ways the Air Force should react but according to commanders, the Air Force *has* to improve its technical training programs for officers. Commanders concede, "AF technical training and OJT is a time-tested success for providing outstanding enlisted technicians. It is an utter failure for officers." Moreover, commanders voiced "It is clear that training in our career field is lacking and has lagged behind needed training experienced by field officers. Although an argument can be made that this will always be the case, the SC community has been less than aggressive at correspondence course, traveling training, full use of distance learning and more over a required curriculum that will prepare our officers at each level to succeed."

These comments, like so many others, evoke a desire for new, more effective methods of training. The concept of customizable training might benefit the career field if it were determined that certain skills were needed by certain Major Commands, bases, squadrons or jobs. In the words of a Communication-Information commander: "Training is the number one area we can improve on to directly effect our productivity, yet it is usually shoved to the side". The training issues can not continue to be shoved to the side. They need to be addressed by the Air Force if the Communication-Information career field is to be utilized to its maximum potential.

**Limitations and Suggestions for Future Research**

There are countless aspects of the IRM domain that could be researched to enhance previous studies including this one. As is the case with all research, there were limitations to this study. One limitation is the survey used. Although it was approved and determined reliable, improvements certainly could be made. For instance, in collecting demographic information, there was evidence of confusion regarding AFSC and shreadouts. Furthermore, the survey originally designed by Schmidt (1997) used a defined list of skills based on the literature. These skills were assumed relevant to the Air Force Communication-Information squadron. A more open-ended survey designed to solicit important skills might provide different skills than the ones used in this research effort. While the list of skills used here has been utilized in previous IRM research, it is possible that a number of pertinent skills were overlooked and were not included in the survey.

A very interesting and beneficial study would be to determine the exact technical needs of each of the Major Commands within the Air Force in regards to the Communication-Information squadrons or duties. If it could be determined that certain commands expected or required certain types of skills (such as CASE methods or Decision Support Systems), then the Air Force could tailor its officers and enlisted to be specialists or experts in those tasks. Since the missions of each of the Major Commands vary widely, it might be found that Communication-Information support at various levels of these commands is different. While it may represent a major change to how the Air Force conducts officer assignments, the Air Force personnel community may wish to

consider whether or not Communication-Information officers should stay in one Major Command for their career depending on their technical expertise or specialties.

Another avenue for future research would be to conduct a Delphi technique study with commanders. This technique originated from the need to improve reliability of expert opinion and can allow decision-makers to forecast future events where the input provided is mainly subjective (Helmer, 1967:3). Commanders seemed very willing to offer suggestions to improve current situations. In depth interviews could also provide more information useful for understanding today's Air Force IRM environment.

A final suggestion for future research is in the privatization and outsourcing of different aspects of the Communication-Information career field. Many commanders alluded to this almost inescapable phenomenon in today's corporate atmosphere in their comments. A study attempting to find out the benefits and disadvantages to outsourcing training within the career field may prove to be consequential.

**Final Thought**

The implications of this study are important to the Air Force and those in the Communication-Information career field. It is paramount that these skills be improved to meet the tough challenges posed by information operations, information warfare and information protection. Perhaps this study will further the Air Force's efforts in handling and organizing a new career field. The results seem to parallel what researcher Mark Simkin (1996) found to be true regarding desired skills for the field. "In the long run, we may see what is really needed – inhouse training that enhances both technical and communication skills. In the short run, we are more likely to observe hiring practices

that favor good communication skills even at the expense of superior technical qualifications" (Simkin,1996:76). This study showed that regardless of how they rank, interpersonal, managerial and technical skills are essential to the IRM professional and Communication-Information community involvement is critical to the success of career development. Continued commitment, investment of time and strategic visions to steer the career field will make the career field responsive to the Air Force and Department of Defense missions.

## Appendix A – IRM Core Skills Extracted from Literature

### Corporate Hiring Criteria
### (Young and Lee, 1997)

**INTERPERSONAL SKILLS**
Verbal skills
Cross-functional group work
Written communication skills
Work group software

**OPERATING SYSTEMS**
32-bit operating systems
Mainframe operating systems
16-bit operating systems
UNIX operating systems
Apple/MAC operating systems
Low-level languages

**DEVELOPMENT AND MANAGEMENT OF APPLICATIONS**
System development methods
Client/Server tools
Object-oriented programming
Data file structure
CASE software
Project management tools
IS management

**NETWORKS AND COMMUNICATIONS**
Networks (local/wide-area)
Network software
Telecommunications

**LANGUAGES**
High-level languages
Object-oriented languages
Mainframe query languages
Mainframe 4$^{th}$ generation languages
Expert system languages

**PERSONAL COMPUTER TOOLS**
PC data base tools
PD spreadsheet tools
Business graphics/Desktop publishing
Multimedia computing

**The IS Expectation Gap:**
**Expectations Versus Academic Preparations**
**(Trauth, Farwell, and Lee, 1993)**

**IS TASKS**

Analyze IS solutions to Business Problems
Analyze Business Problems
Integrate Networks
Integrate Existing Business Applications
Develop Databases
Integrate New with Existing Business Applications
Implement New/Changed Computer-Supported Business Processes
Manage/Plan Systems Development/Project Implementation
Manage/Plan feasibility/Approval for New Systems and Technology

**TECHNICAL SKILLS**

Network
Telecommunications
Relational Databases
Fourth Generation Languages
Systems Integration
Distributed Processing
Data Management
Other (executive IS, image processing, UNIX, end-user computing)
Structured Programming/CASE Methods or tools
Decision Support Systems
Systems Analysis/Structured Analysis
System Life Cycle Management
Operating Systems: Micros
A specific programming language (C, Basic, Pascal)
Expert Systems/ AI
COBOL/Other third generation language
Operating Systems: Mini
Operating System: Mainframe
Assembly Language

**ABILITIES**

**HUMAN**

Maintain Productive User/Client Relationships
Accomplish Assignments
Plan/Executive Work in a collaborative environment
Be self-directed and proactive
Work cooperatively in a one-to-one and project management team
Deal with ambiguity

Plan, organize and lead projects
Plan, organize and write clear, concise, effective memos, reports and documentation
Develop and deliver effective, informative and persuasive presentations
Teach others

**BUSINESS**

Understand the business environment
Learn about business functions
Knowledge of a specific business function
Be sensitive to organizational culture and policies

**TECHNICAL**

Interpret business problems and develop appropriate technology solutions
Focus on technology as a means, not an end
Ability to learn about new technology
Ability to understand technology trends

**Critical Skills and Knowledge Requirements of IS Professionals (Lee, Trauth, Farwell, 1995)**

**TECHNICAL SPECIALTIES KNOWLEDGE**

COBOL, or other third generation language
Telecommunications
Networks
Operating Systems: Mainframes, Minis, Micros
4th generation languages
Systems Integration
Systems Analysis/Structured Analysis
Systems Life Cycle Management
Relational Databases
Distributed Processing
A specific programming language
Data management (i.e. data modeling)
Structured Programming/CASE methods or tools
Decisions Support Systems
Assembly Language
Expert System/Artificial Intelligence

**TECHNOLOGY MANAGEMENT KNOWLEDGE**

Ability to learn knew technologies
Ability to focus on technology as a means, not an end
Ability to understand technological trends

**BUSINESS FUNCTIONAL KNOWLEDGE**

Ability to learn about business functions
Ability to interpret business problems and develop appropriate technical solutions
Ability to understand the business environment
Knowledge of the business functions

**INTERPERSONAL AND MANAGEMENT SKILLS**

Ability to work cooperatively in a one-on-one and project team environment
Ability to plan and execute work in a collaborative environment
Ability to deal with ambiguity
Ability to work closely with customers and maintain productive user or client relationship
Ability to accomplish assignments
Ability to teach others
Ability to plan, organize and lead projects
Ability to develop and deliver effective, informative and persuasive presentations
Ability to plan, organize and write concise, effective memos, reports, documentation
Ability to be self-directed and proactive
Ability to be sensitive to organizational culture/politics

**MIS Skills for the 1990's**
**A Survey of MIS Manager's Perceptions**
**(Robert L. Leitheiser, 1992)**

**ANALYSIS AND DESIGN**
Design cost/benefit analysis
Feasibility study
Package cost/benefit analysis
IRD methods
Semantic Modeling
O-O analysis
Conceptual design
CASE

**PROGRAMMING**
Structured design
Documentation
Quality assurance
Data structures
Security/Privacy
DS methodology
Prototyping
Algorithms

**INTERPERSONAL**
Listening
Work with others
Writing
Work alone
Persuasion
Presenting
Respond to emotions
Training

**BUSINESS**
Project planning
Business functions
Industry
Ethics
MIS planning
Technology problems
Competitive advantage
Technology usefulness

**ENVIRONMENT**
Mainframe
Personal computer
Multiple
Minicomputer
SNA
SAA
UNIX

**LANGUAGE**
COBOL
JCL
Fourth generation languages
SQL
O-O language
AI language
ADA

**APPLICATION**
Relational databases
Hierarchical and network databases
Distributed applications
DSS
EIS
Collaborative systems
Expert systems

## Top Ten Survival Skills for the IS Professional
## (Longenecker, Simonetti, and Mulias, 1996)

**TEN KEY SURVIVAL SKILLS FOR IS PROFESSIONALS**

Ability to balance technical and nontechnical skills
Strong interpersonal and communication skills
An orientation toward business solutions
Ability to be an effective team player
Strong project management skills
Effective planning and organization skills
Strong analytical and creative skills
Flexibility and adaptability to change
Responsiveness and a customer orientation
Ability to function as a teacher and coach

**CUSTOMER EXPECTATIONS**

Technical expertise in understanding languages
Help in identifying project requirements and needs
Direction, leadership and guidance on technical applications
Practical applications that support strategic direction and business decisions
Shared ownership in a project
Ongoing communication and accessibility
Flexibility in responding to changes
Innovative and creative solutions and applications
Realism and honesty regarding commitments
Quality assurance and commitment to the end project
Prompt response to aid in resolving problems
Cost effectiveness and timely delivery of products and services

**An Empirical Assessment of the**
**Information Resource Management Construct**
**(Lewis, Synder, and Rainer, 1995)**

**PLANNING**
Information systems/technology plan
Planning process for information systems and technology
User supported distributed IT facilities
Plan for corporate-wide information systems and technology
Formal support for end-user computing
Training programs for end-users
Information systems/technology plan reflects business goals
Assessment of potential for new technologies

**SECURITY**
Assess control security
Data security
Security awareness program
Business continuity/disaster recovery plan

**TECHNOLOGY INTEGRATION**
Distributed facilities
Office automation
Communication integration
Network integration
Information technology integration

**ADVISORY COMMITTEES**
Information systems and technology advisory
Senior management participation
Users participate in advisory committees

**ENTERPRISE MODEL**
Data communications between central and distributed facilities
Inventory of company IT facilities
Formal methodology for systems development
Inventory of corporate data and information
Standards for distributed information systems and technology
Documentation for corporate-wide information flow
Use of automated development tools
Corporate-wide adherence to information systems and technology standards

**INFORMATION INTEGRATION**

Application systems integration
Data integration between applications

**DATA ADMINISTRATION**

Data administration
Corporate data architecture
Quality assurance program for information systems and facilities
Data dictionary

## Appendix B. Information Resources Management College Courses

## Supporting Clinger/Cohen Federal CIO Competencies

## Advanced Management Program (AMP) and Intensive Course Listing

In order to complete the CIO Certificate program students must complete all primary course offerings for a minimum of six subject areas. *Policy* and *Performance and Results-Based Management* are mandatory. Additionally, the student must complete two more courses selected from either the primary or enrichment listings for any subject area.

| KEY COMPETENCY SUBJECT AREA | AMP COURSES | INTENSIVE COURSES |
|---|---|---|
| 1. Policy | ***Primary***<br><br>Core courses<br><br>***Enrichment***<br><br>Track: Public Policy in the Information Age | ***Primary***<br><br>**NWC:** New World of the CIO |
| 2. Information Resources Strategic Planning | ***Primary***<br><br>Core Courses | ***Primary***<br><br>**IMP:** Information Management Planning |
| 3. Leadership/Management | ***Primary***<br><br>Elective: Innovative Thinking for the Information Age<br>**OR**<br>Elective: Third Wave Organizations | ***Primary***<br><br>**LDC:** Leadership of the 21st Century |
| 4. Process Improvement | ***Primary***<br><br>Core courses<br><br>***Enrichment***<br><br>Track: Best Practices in Process Improvement<br>(Previously Functional Leadership in the Information Age)<br><br>Elective: Systems Dynamics: Dealing with Complexity<br>Elective: Electronic Commerce | ***Primary***<br><br>**LTO:** Reengineering Organizational Processes<br><br>***Enrichment***<br><br>**MAS:** Evaluating Strategic Alternatives with Modeling and Simulation<br><br>**ECB:** Electronic Commerce: Doing Business on the Information Highway |

| | | |
|---|---|---|
| 5. Capital Planning and Investment | ***Primary***<br><br>Elective: IT Capital Planning (Previously Managing Information Technology Investments) | ***Primary***<br><br>**MTI:** IT Capital Planning (Previously Managing Information Technology Investments) |
| 6. Performance and Results-Based Management | ***Primary***<br>Elective: Measuring Results of Organizational Performance<br><br>***Enrichment***<br><br>Elective: Information Visualization | ***Primary***<br>**MOP:** Measuring Results of Organizational Performance<br><br>***Enrichment***<br><br>**INV:** Information Visualization |
| 7. Technology Assessment | ***Primary***<br><br>Core Courses<br><br>**PLUS**<br>Track: Emerging Information Technologies<br><br>***Enrichment***<br><br>Elective: The Information Highway<br>Elective: Applying Multimedia Technology<br>Elective: Computer Modeling and Simulation<br>Elective: Virtual Reality for Managers<br>Elective: Telecommunications Technologies | ***Primary***<br><br>**CST:** Critical Information System Technologies (Previously Emerging Information Technologies)<br><br>***Enrichment***<br><br>**IHW:** The Information Highway<br><br>**IDS:** Improving Organizational Performance with Intelligent Decision Making Systems<br><br>**WEB:** Strategic Management of Your Web Site<br><br>**TEL:** Telecommunications Technologies |
| 8. Architectures | ***Primary***<br><br>Elective: Managing Information Architectures and Infrastructures | ***Primary***<br><br>**ARC:** Managing Information Architectures and Infrastructures |
| 9. Security | ***Primary***<br><br>Elective: Managing Information Security in a Networked Environment | ***Primary***<br><br>**SEC:** Managing Information Security in a Networked Environment |

## Appendix C – Survey

Survey Control Number:
USAF SCN 98-22
Exp Date: 30 Jun 98


# INFORMATION RESOURCE MANAGEMENT REQUIREMENTS SURVEY

1Lt Susan E. Phillips
AFIT/LAA
Wright-Patterson AFB OH

**This survey is designed to gather important data on the critical skills required for Information Resource Management (IRM) within the Air Force. The target group for this study is comprised of Air Force Commanders serving in the Communication and Information career field.**

## PART I

**Please provide the following demographic information by circling the correct response on the survey.**

**1. What is your rank?**

(1) 2 Lt
(2) 1 Lt
(3) Captain
(4) Major
(5) Lt Colonel

**2. How long have you been in the Air Force?**

(1) Less than 2 years
(2) 2 but less than 4 years
(3) 4 but less than 8 years
(4) 8 but less than 11years
(5) 11 but less than 14 years
(6) 14 but less than 17 years
(7) 17 but less than 20 years
(8) 20 but less than 23 years
(9) 23 years or more

**3. What is your current Air Force Specialty Code (AFSC)?**

(1) 33S1
(2) 33S3
(3) 33S4
(4) Other _____

**4. If your current AFSC is 33S3/1, do you have a shreadout?**

(1) A, Electrical Engineer
(2) B, Software Engineer
(3) C, Software Programmer/Analyst
(4) No shreadout
(5) My AFSC is not 33S3/1

**PART I (cont)**

**Please provide the following demographic information by circling the correct response on the survey.**

**5. How many years have you been in your current duty AFSC?**

(1) Less than 1 year
(2) 1 year but less than 2
(3) 2 years but less than 3
(4) 3 years but less than 4
(5) 4 years but less than 5
(6) 5 years but less than 6
(7) 6 years or more

**6. What is your highest educational level?**

(1) Bachelor's degree
(2) Master's degree level courses
(3) Completed master's degree
(4) Doctoral degree level courses
(5) Completed doctoral degree

**7. Have you attended the Basic Communications Officer Training Course (BCOT) or its equivalent?**

(1) Yes
(2) No

**8. Have you attended the Advanced Communications Officer Training Course (ACOT) or its equivalent?**

(1) Yes
(2) No

**9. Have you participated in Scope Eagle or its equivalent?**

(1) Yes
(2) No

## Part II SKILLS/ACTIVITIES

**Using the scale provided, please indicate how critical you think knowledge/skills in the following activities are to performing the functions of a Communication–Information Officer. Please put the corresponding number in the blank provided.**

| Not at all Important | Slightly Important | Moderately Important | Very Important | Extremely Important |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

### TECHNICAL SPECIALTIES

10. _____ Telecommunications (hardware, phones, modems, cables, satellites, etc)
11. _____ Networks (LAN, WAN, Corporate-wide, etc)
12. _____ Systems Integration
13. _____ Systems Analysis/Structured Analysis (formal method)
14 _____ Systems Life Cycle Management
15. _____ Relational Databases
16. _____ Distributed Processing
17. _____ CASE Methods or Tools
18. _____ Decision Support Systems
19. _____ Expert Systems/Artificial Intelligence
20. _____ Operating Systems for Mainframe, Minis, Micros, Networks
21. _____ Office Automation (E-mail, schedulers, etc)

### TECHNOLOGY MANAGEMENT

22. _____ Ability to learn and implement new technologies
23. _____ Ability to understand technological trends and potentials
24. _____ Ability to plan and set standards for corporate-wide information system/technology plan
25. _____ Information and system security
26. _____ Contingency planning/disaster recovery
27. _____ Establish/monitor corporate data architecture
28. _____ Ability to interpret and solve business problems

### INTERPERSONAL SKILLS

29. _____ Ability to work closely with customers and maintain a productive user or client relationship
30. _____ Ability to train/teach others to include end-users
31. _____ Ability to plan, organize, and lead projects (project management)
32. _____ Ability to write clearly, succinctly, and purposefully
33. _____ Ability to communicate verbally, one-on-one and group briefings

## Part III SKILLS OF ORGANIZATION

**Using the scale provided, please indicate your general perception of these skills exhibited by all officers of your organization who perform them. Please put the corresponding number in the blank provided. If specialty not performed write N/A.**

| Not at All Skilled | Somewhat Skilled | Moderately Skilled | Highly Skilled | Extremely Skilled |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

### TECHNICAL SPECIALTIES

34. _____ Telecommunications (hardware, phones, modems, cables, satellites, etc)
35. _____ Networks (LAN, WAN, Corporate-wide, etc)
36. _____ Systems Integration
37. _____ Systems Analysis/Structured Analysis (formal method)
38. _____ Systems Life Cycle Management
39. _____ Relational Databases
40. _____ Distributed Processing
41. _____ CASE Methods or Tools
42. _____ Decision Support Systems
43. _____ Expert Systems/Artificial Intelligence
44. _____ Operating Systems for Mainframe, Minis, Micros, Networks
45. _____ Office Automation (E-mail, schedulers, etc)

### TECHNOLOGY MANAGEMENT

46. _____ Ability to learn and implement new technologies
47. _____ Ability to understand technological trends and potentials
48. _____ Ability to plan and set standards for corporate-wide information system/technology plan
49. _____ Information and system security
50. _____ Contingency planning/disaster recovery
51. _____ Establish/monitor corporate data architecture
52. _____ Ability to interpret and solve business problems

### INTERPERSONAL SKILLS

53. _____ Ability to work closely with customers and maintain a productive user or client relationship
54. _____ Ability to train/teach others to include end-users
55. _____ Ability to plan, organize, and lead projects (project management)
56. _____ Ability to write clearly, succinctly, and purposefully
57. _____ Ability to communicate verbally, one-on-one and group briefings

## Part IV SOURCE OF TRAINING

**Please indicate the primary source of any training/education YOU have received in the following areas.**

(1) No training in this area
(2) Self taught (explain in comments section)
(3) On the job training (Air Force)
(4) Correspondence courses
(5) Air Force technical training program
(6) Undergraduate degree program
(7) Master's degree program
(8) Other (explain in comments section)

### TECHNICAL SPECIALTIES

58. _____ Telecommunications (hardware, phones, modems, cables, satellites, etc)
59. _____ Networks (LAN, WAN, Corporate-wide, etc)
60. _____ Systems Integration
61. _____ Systems Analysis/Structured Analysis
62. _____ Systems Development Life Cycle Management
63. _____ Relational Databases
64. _____ Distributed Processing
65. _____ CASE Methods or Tools
66. _____ Decision Support Systems
67. _____ Expert Systems/Artificial Intelligence
68. _____ Operating Systems for Mainframe, Minis, Micros, Networks
69. _____ Office Automation (E-mail, schedulers, etc)

### TECHNOLOGY MANAGEMENT

70. _____ Learn and implement new technologies
71. _____ Understand technological trends and potentials
72. _____ Plan and set standards for corporate-wide information system/technology plan
73. _____ Information and system security
74. _____ Contingency planning/disaster recovery
75. _____ Establish/monitor corporate data architecture
76. _____ Interpret and solve business problems and develop appropriate solutions

### INTERPERSONAL SKILLS

77. _____ How to work closely with customers and maintain productive user or client relationship
78. _____ How to train/teach others to include end users
79. _____ How to plan, organize, and lead projects (project management)
80. _____ How to write clearly, succinctly, and purposefully
81. _____ How to communicate verbally, one-on-one and group briefing

## Part V SOURCE OF TRAINING OF ORGANIZATION

**Please indicate the primary source of any training/education You expect YOUR ORGANIZATION'S MEMBERS to receive in these areas.**

(1) No training in this area
(2) Self taught (explain in comments section)
(3) On the job training (Air Force)
(4) Correspondence courses
(5) Air Force technical training program
(6) Undergraduate degree program
(7) Master's degree program
(8) Other (explain in comments section)

### TECHNICAL SPECIALTIES

82. _____ Telecommunications (hardware, phones, modems, cables, satellites, etc)
83. _____ Networks (LAN, WAN, Corporate-wide, etc)
84. _____ Systems Integration
85. _____ Systems Analysis/Structured Analysis
86. _____ Systems Development Life Cycle Management
87. _____ Relational Databases
88. _____ Distributed Processing
89. _____ CASE Methods or Tools
90. _____ Decision Support Systems
91. _____ Expert Systems/Artificial Intelligence
92. _____ Operating Systems for Mainframe, Minis, Micros, Networks
93. _____ Office Automation (E-mail, schedulers, etc)

### TECHNOLOGY MANAGEMENT

94. _____ Learn and implement new technologies
95. _____ Understand technological trends and potentials
96. _____ Plan and set standards for corporate-wide information system/technology plan
97. _____ Information and system security
98. _____ Contingency planning/disaster recovery
99. _____ Establish/monitor corporate data architecture
100. _____ Interpret and solve business problems and develop appropriate solutions

### INTERPERSONAL SKILLS

101. _____ How to work closely with customers and maintain productive user or client relationship
102. _____ How to train/teach others to include end users
103. _____ How to plan, organize, and lead projects (project management)
104. _____ How to write clearly, succinctly, and purposefully
105. _____ How to communicate verbally, one-on-one and group briefing

**Part VI COMMENTS**

**Your comments, suggestions, or additional information is welcome. Please use this space to provide and any additional thoughts on the survey or the research area.**

Thank you for taking the time to complete the survey and help in my research effort. As commanders, your input is extremely beneficial for understanding how well the Air Force is preparing personnel for transition into the Information Age. All information provided will be used solely for consolidation and reporting as part of this study, individual responses will remain anonymous. If you have questions or comments please contact me at:

1Lt Susan E. Phillips
AFIT/LAA
Wright-Patterson AFB OH
DSN 785-7777 x2127
sphillip@afit.af.mil.

## Appendix D - Commander Comments

**Theme 1**: Technology changes too fast to keep up with it so it is imperative to make the best use of sources of training.

"All in all I've found that most of our junior officers are not prepared for the information management world or the network development responsibilities of the career field. This is mainly due to the fact that we don't require a college degree in any of these areas for a general 33S3 position. If the networks are so important and if they must be manned by a military member then we should insist that a certified network engineer is put in that position. We rely too much on our junior enlisted in this vital capacity and in that we have done disfavor to the USAF."

"It is interesting that we've merged a variety of career fields into the 33Sx arena over the last 15 years, yet we have failed to teach our own officers the aspects of our various jobs. Yes changes have been made to the BCOT and ACOT curriculum, but we have neglected those who have attended the schools in the past, or are too junior to attend soon."

"Technological changes are happening a great deal faster than the ability of our Air Force to keep pace. The result is more reliance on on-the-job training and commercially procured training."

"Air Force Communication – Information officers can't sit back once earning their undergraduate and graduate degrees. They must continue to seek out training opportunities wherever and whenever possible."

"In a technically transient career field such as ours, it is difficult to keep career field members up on current technologies and integration activities. Would it be possible to have small correspondence packages developed for subjects like the technical specialties listed in the survey? Also helpful would be lessons from the commands on any unique systems, equipment, capabilities etc."

"The best training available today is from commercial sources. These courses offer current information on the latest technological developments. Unfortunately, they do not always directly relate to our Air Force programs."

"Air Force courses (tech schools, correspondence) should be the primary source of training, however, it is hard to get slots in these courses and they are seldom current enough or in-depth enough."

"Wish we had time to train all our folks on this stuff, but not in today's high ops tempo Air Force. It's mostly OJT, self-taught (survival) type training. With the Comm community dwindling down their people and services the units, (every Joe Schmoe) is forced to try to learn this stuff to keep things working. This is on top of learning their actual jobs."

"With the increased emphasis on e-mail etc, we all should receive comm (LAN, network) training at commissioning/enlisted sources!"

"Need more mini courses for company grade officers to do their jobs."

"CBTs seem to be a great idea, but nobody has time to sit at their desk and take CBT courses while still on the job. We have too few people and too many fires to put out."

"Training is the number 1 area we can improve on to directly effect our productivity, yet it is usually shoved to the side. I would love to provide user application training or LAN administration training but do not have the manpower available. The latest AF CBT proposal was a great step in the right direction."

"It appears that out officer training is improving. Certainly it is better than whet I went through. It is a large job, but our career field is so diverse that we must make the effort to teach some about a lot and probably don't do much justice as a result. The recent initiative to send 2Lts to the base comm squadron as overages to help with initial training is absolutely great! Give me more."

"Many of the technologies we in the C-I business are responsible for are changing too rapidly for any government designed course to keep pace. That only leaves commercially available tech training as a viable solution paid for out of O and M dollars."

"Since information technology is a moving target, I strongly recommend specialized courses (tech training) in office automation and operating systems through commercial vendors. The instructor staff at BCOT/ACOT cannot keep up with those changes."

"Self-taught is the key concept in the information age."

"I believe the USAF has short-circuited comm officers today with the current BCOT and ACOT courses. Self-paced student lead seminars work for some subjects but not for an entire course."

"The Air Force currently expects comm and info officers to learn too much via OJT and/or osmosis. We have reduced the C and I technical training too much. WE need longer courses that teach more."

"With the pace of technology, there is no way to avoid a heavy requirement for self-study. No formal training will ever replace the need to stay current individually. AF technical training and OJT is a time-tested success for providing outstanding enlisted technicians. It is an utter failure for officers."

"BCOT and ACOT are, in my opinion, a complete waste of time. The tools needed are all available on the open market. The key is to provide the training as they need it, then put them into a position to use it."

"Our career field has changed drastically since I first came in. Although our new lieutenants are generally technically superior on small computers, they don't seem to know much about telecom, even after BCOT."

"ACOT (Jun 93) did not prepare me for what I needed to know as a field grade officer in the 33Sx career field."

"Other career fields have 'check rides' of sorts. This career field needs the same!"

"It is clear that training in our career field is lacking and has lagged behind needed training experienced by field officers. Although an argument can be made that this will always be the case, the SC community has been less than aggressive at correspondence course, traveling training, full use of distance learning and more over a required curriculum that will prepare our officers at each level to succeed."

"Air Force does a bad job providing technical training to their officers. Often by the time an officer gets to attend training it is too late in his career or they are PCSed shortly after their training so the funding unit doesn't benefit even though they paid for the training. Timing is everything."

"I have had difficulty with the career field since being non-voled into it. The people at assignments continually give out conflicting information and I have missed opportunities for jobs because of their chaos. The career field is in total disorganization from a personnel management perspective and until this is fixed, other things like better training cannot be addressed. After being 'jacked around' so much who wants to stay and fight just for survival?"

**Theme 2**: Contracting or outsourcing training may be the best option for staying current and technically competent in Communication-Information functions.

"Outsource BCOT and ACOT training! Provide professional entry level and mid assignment level training via contractor with commitment accrual much like UPT/UNT."

"Contractor schools have provided much better training that any military training. The military can not keep up with technology training."

"Much of the training required on operating systems and office automation will be acquired through contractors. It is difficult to find detailed training in these areas through Air Force organizations."

"I personally believe that the USAF could benefit tremendously from corporate-based on–target training. For example, if someone manipulates designs, constructs relative databases as part of their job duties, then the USAF would be best served by providing ''direct' training to prepare them to accomplish their duties. This would be better compared to the predominant environment in the USAF where we can't afford the training so we let that person flounder until they've 'absorbed' enough information or time to be considered qualified."

**Theme 3**: There are several immediate skill areas desperately needing attention.

"My personal view is that we need strong leaders, organizers, and trainers who just happen to be in the comm career field. I've made my money on how I did my job not what I knew going into an assignment. Technology changes so darn fast that it is hard to keep up with. The comm career field needs breadth of experience, not necessarily focused experts. We can pay a contractor to be a skilled Database person."

"Telecommunications is the future, networks, security, ISDN etc. "

"Technically knowledge regarding electronics is lacking. Many of our officers are expected to know how things work in addition to the basic operation of systems."

"Networking skills are desperately needed. I recommend we re-compile Air Force formal training to ride industry's coat tails.'

"Many of the areas that are hurting us in Project Management, BPR, and life-cycle management. Good technicians are working on projects for years that are failing or being written off prior to implementation. There does not seem to be a readily accessible source for the skills we need to correct this trend at the base or MAJCOM level."

"There is too much information out there (information overload) so we need our tech schools to add structure to the chaos that is 'information'. Let's focus on skills that will not be outsourced or privatized."

"The best C-I officer is the one who is technically smart, customer oriented, and can communicate. I recommend all comm officers do the following: undergrad degree in a technical discipline (EE,CS, math), attend BCOT, get master's in telecommunications, information technology, then attend ACOT."

"The truly successful officers I have known excelled in the interpersonal skills area. That's what's absolutely essential. All the technical training changes every year anyway. It's nice to have, but not absolutely essential for many jobs, unless you are working as a technical rep/ researcher. If you are a squadron commander or flight commander interpersonal skills are what counts."

"The legal ramifications of record management alone may create a serious problem for the continued existence of the career field since most of the 33Sx officers are totally unaware of the old 'IM' responsibilities associated with this task."

"The Air Force must emphasize in training: technologies and changes; systems; acquisitions, cycle and budget; integration; operational/combat systems organizations; information protection; and program management."

"The average communicator needs to know very little about Artificial Intelligence and Expert systems. He/she should be able to pick up all office automation by osmosis, during high school and college with little or no formal training."

"Interpersonal skills are the key to any good officer's success."

"Core skills for today's comm officer are tough to nail down. I think an introduction to today's emerging technologies is an important foundation with strong computer/LAN and management skills. We don't have to know how to operate or fix it for the most part, but we have to know how to relate with customer needs, positively influence subordinates, write talk, and plan projects."

"Interpersonal skills cannot be taught."

"Even after defining core skills needed by blue suit members how do we retain those people?

"Too many times in the past twelve years I have heard numerous 33Sx officers claim they do not need to understand the technicalities of our business. These officers are short changing the career field."

"Once again no emphasis has been placed on operations and maintenance or how to manage existing systems, which is what most of this career field is all about. Your survey is oriented too much towards a project management/program office type agency. There is little use in the field for systems analysis, CASE methods and tools, DSS, AI and so on."

## Bibliography


"Advanced Communications Officer Training (ACOT) Curriculum." Air Force Communications/Information Officer Training (AFCOT), 3 pgs. WWWeb, http://www.kee.aetc.af.mil./ACOT/acot/curr.htm. (18 Mar 98).

Air Force Chief Information Officer (AFCIO) – Home Page. WWWeb, http//www.cio.hq.af.mil. (3 Apr 98).

-----. National Defense University (NDU) WWWeb, http://www.ndu.edu/ndu/irmc/cio.html.

-----. Definitions. WWWeb, http://www.cio.hq.af.mil/defn.htm#irmdef (3 Apr 98)

-----. IT Responsibilities – Information Resource Management. WWWeb, http://www.cio.hq.af.mil/itirm.htm (5 Jun 97).

-----. IT Responsibilities – Training and Education. WWWeb, http://www.cio.hq.af.mil/ittrng,htm (8 May 97).

Air Force Information Resources Management (AFIRM) – VISTAS. WWWeb, http://www.cio.hq.af.mil/docs/vistas.htm (18 Mar 98).

Alreck, Pamela L. and Robert B. Settle. The Survey Research Handbook (Second Edition). Chicago IL: Richard D. Irwin, Inc., 1995.

"Basic Communications Officer Training (BCOT) Core Coursework." Air Force Communications/Information Officer Training (AFCOT), 4 pgs. WWWeb, http://www.kee.aetc.af.mil./ACOT/bcot/curr.htm.

Biros, David P. and Stewart Cole. An Analysis of the Effectiveness of Air Force Information Management Officer Training Based on the Perceived Needs of Current Information Management Officers. MS Thesis, AFIT/GIR/LSC/92D-1. School of Systems and Logistics, Air Force Institute of Technology (AU), Wright-Patterson AFB OH, December 1992 (AD-A258138).

Browning, Miriam F., Joan S. Creighton, and Debra F. Thompson. "Department of Defense Information Systems Workforce: Education, Training, and Career Development," Washington: Government Printing Office October 1992 (AD-A264930).

Career Families Based on Duty AFSC." WWWeb http://www.afpc.af.mil/analysis/demograf/CAREER.html. (15 Jun 98).

Cascio, Wayne F. Applied Psychology in Personnel Management (Fourth Edition). Englewood Cliffs NJ: Prentice-Hall, Inc., 1991.

Ching, Russel K. H., Louis W. Glorfeld, and Monica Lam. "An Investigative Study of Core MIS Skills," Proceedings of the Americas Conference on Information Systems. 11010-1012. Indianapolis: Association for Information Systems 1997.

Cooper, Donald R. and William C. Emory. Business Research Methods (Fifth Edition). Chicago IL: Richard D. Irwin, Inc., 1995.

Davis, Dwight B. "Hard Demand for Soft Skills," Datamation, 39: 29-32, (15 Jan 1993).

Department of the Air Force. Air Education and Training Command Programming Plan. (AETC PPlan) Air Force Directive 96-07. Washington: GPO, 16 Apr 1996.

Department of the Air Force. Basic Plan. Head Quarters United States Air Force Program Action Directive (HQ USAF PAD) 96-03 Washington: GPO, March 1996.

Department of the Air Force. Communication and Information. AFI 33-389. Washington: HQ USAF, 1 November 1996.

Department of Defense. Secretary of the Air Force Order. SAFO 560.1. Washington: Government Printing Office (7 Feb 1997).

Diebold, D. "Information Resource Management – The New Challenge," Infosystems, 26: 50-53 (June 1979).

-----. "IRM: New Directions in Management," Infosystems, 26: 41-42, November (1979).

Federal Computer Week (FCW). WWWeb, http://fcw.com/pubs/fcw/1997/1103/fcw-insidnews-11-3-97.htm. (3 Nov 97).

-----. WWWeb, http://fcw.com/pubs/fcw/1997/0623/fcw-polclinger-6-23-1997.html. (23 Jun 97).

Harkleroad, Joseph E. A Case Study of Information Resource Management in the Department of Defense. MS thesis, Naval Post Graduate School, Monterey CA March 1992 (AD-A253020).

Helmer, Olaf. Convergence of Expert Consensus Through Feedback. Technical Report P-2973. Santa Monica CA: Rand Corporation, 1967 (AD-605-522).

Holmes, Monica C. and Roger L. Hayen. "Putting Muscle Into the 'M' in an MIS Program," Proceedings of the Americas Conference on Information Systems. 1004-1006. Indianapolis: Association for Information Systems 1997.

IS '97 – Model Curriculum and Guidelines for Undergraduate Degree Programs in Information Systems." WWWeb, http://info.acm.org/education/curricula.html#IS97.

King, Julia. "Labor Confab Issues Call for Training to Combat Shortages," Computerworld, 32: (Jan 1998).

Lee, Denis, Eileen M. Trauth, and Douglas Farwell. "Critical Skills and Knowledge Requirements of IS Professionals: A Joint Academic/Industry Investigation," MIS Quarterly, 19: 313-340 (September 1995).

Leitheiser, Robert L. "MIS Skills for the 1990s: A Survey of MIS Manager's Perceptions," Journal of Management Information Systems, 9: 69-91 (Summer 1992).

Lewis, Bruce R., Charles A. Snyder, and Kelly R. Rainer, Jr. "An Empirical Assessment of the Information Resource Management Construct," Journal of Management Information Systems, 12: 199-223 (Summer 1995).

Longenecker, Clinton O., Jack L. Simonetti, and Mark Mulias. "Survival Skills for the IS Professional," Information Systems Management, 13: 26-31 (Spring 1996).

March, Salvatore T. and Young-Gul Kim. "Information Resource Management: A Metadata Perspective," Journal of Management Information Systems, 5: 4-18 (Winter 1989).

Martin, James. "Evolution of a Species," Computerworld, 34: 37 (April 1995).

Meltzer, Morton F. Information: The Ultimate Management Resource. New York: AMACOM, 1986.

Nations, Colonel William O. Secretary of the Air Force Orders on Information Resources Management (IRM) and Information Management (IM). Washington: Government Printing Office, 11 September 1989.

Pinsonneault, Alan and Kenneth L. Kraemer. "Survey Research Methodology in Management Information Systems: An Assessment," Journal Management Information Systems, 10: (Fall 1993).

Scott, Summer E. An Evaluation of the Educational Background and Knowledge Base of Air Force Information Management Officers. MS thesis, AFIT/GIR/LSR/90D-10. School of Systems and Logistics, Air Force Institute of Technology (AU) Wright-Patterson AFB OH, December 1990 (AD-A230866).

Trauth, Eileen M., Douglas W. Farwell, and Denis Lee. "The Expectation Gap: Industry Expectations Versus Academic Preparation," MIS Quarterly,17: 293-307 (September 1993).

United States Code. (USC) Title 40, Office of the Law Revision Counsel of the House of Representatives, Washington DC, 1989.

-----. Title 44, Office of the Law Revision Counsel of the House of Representatives, Washington DC, 1989.

Young, Dale and Sooun Lee. "Corporate Hiring Criteria for IS Graduates," Information Systems Management, 14: 47-53 (Winter 1997).

## Vita

Lt Susan E. Phillips was born on 11 March 1971 in Salem, New York. She graduated from Salem Washington Academy in 1989 and spent one year studying abroad as a Rotary International Exchange Student in Eskilstuna, Sweden. Upon return to the States, she entered the United States Air Force Academy Preparatory School in Colorado Springs, Colorado. In 1991, she began undergraduate studies at the United States Air Force Academy and in 1995 graduated with a Bachelor of Science Degree in Humanities. She received her commission on 31 May 1995 upon graduation.

Her first assignment was at Travis AFB, California as the 60th Civil Engineer Squadron Section Commander. In March 1997, she entered the Graduate School of Logistics and Acquisition Management, Air Force Institute of Technology and will graduate with a Master of Science Degree in Information Resource Management. Following graduation, she will be assigned to the 99$^{th}$ Communications Squadron at Nellis AFB, Nevada.

Permanent address: 30 Blanchard Street
Salem, New York 12865

# REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 074-0188



| 1. AGENCY USE ONLY (Leave blank) | 2. REPORT DATE | 3. REPORT TYPE AND DATES COVERED |
|---|---|---|
| | September 1998 | Master's Thesis |

**4. TITLE AND SUBTITLE**

**INFORMATION RESOURCE MANAGEMENT: AN ANALYSIS OF THE IMPORTANCE OF CRITICAL SKILLS AS PERCEIVED BY AIR FORCE COMMUNICATIONS AND INFORMATION COMMANDERS**

**5. FUNDING NUMBERS**

**6. AUTHOR(S)**
**Susan E. Phillips, 1Lt, USAF**

**7. PERFORMING ORGANIZATION NAMES(S) AND ADDRESS(S)**

Air Force Institute of Technology
2950 P Street
WPAFB OH 45433-7765

**8. PERFORMING ORGANIZATION REPORT NUMBER**

AFIT/GIR/LAS/98S-11

**9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)**

**10. SPONSORING / MONITORING AGENCY REPORT NUMBER**

**11. SUPPLEMENTARY NOTES**

**12a. DISTRIBUTION / AVAILABILITY STATEMENT**

Approved for public release; distribution unlimited

**12b. DISTRIBUTION CODE**

**13. ABSTRACT (*Maximum 200 Words*)**

**This study explores what Information Resource Management skills are required in the Communications-Information career field as perceived by the Air Force commanders. A previous study polled junior officers, and this study furthers the research by sampling commanders who represent the leadership of the Communication-Information career field. The following questions were addressed: (1) What are the skills commanders perceive as most important to the IRM mission? (2) Of those skills, where do the commanders perceive their organization's members' weaknesses? (3) What are the primary sources of training for commanders in the career field? (4) What expectations do commanders have for the training of their organizations? The results of skill importance concurred with current literature, including that pertaining to junior Air Force officers. The interpersonal skill category was concluded most important, followed by managerial and then technical. Results of ideal training sources for the career field are presented, advocating a revision to current Air Force technical courses. Notable commander comments referring to skill importance and areas of weakness, as well as viable training sources are provided.**

| 14. Subject Terms | 15. NUMBER OF PAGES |
|---|---|
| Information Resource Management; Skills; Commander Expectations; Training | **113** |
| | **16. PRICE CODE** |

| 17. SECURITY CLASSIFICATION OF REPORT | 18. SECURITY CLASSIFICATION OF THIS PAGE | 19. SECURITY CLASSIFICATION OF ABSTRACT | 20. LIMITATION OF ABSTRACT |
|---|---|---|---|
| UNCLASSIFIED | UNCLASSIFIED | UNCLASSIFIED | UL |

AFIT Control Number AFIT/GIR/LAS/98S-11

# AFIT RESEARCH ASSESSMENT

The purpose of this questionnaire is to determine the potential for current and future applications of AFIT thesis research. **Please return completed questionnaire** to: AIR FORCE INSTITUTE OF TECHNOLOGY/LAC, 2950 P STREET, WRIGHT-PATTERSON AFB OH 45433-7765. Your response is **important.** Thank you.

1. Did this research contribute to a current research project? a. Yes b. No

2. Do you believe this research topic is significant enough that it would have been researched (or contracted) by your organization or another agency if AFIT had not researched it?
a. Yes b. No

3. **Please estimate** what this research would have cost in terms of manpower and dollars if it had been accomplished under contract or if it had been done in-house.

Man Years_____ $_____

4. Whether or not you were able to establish an equivalent value for this research (in Question 3), what is your estimate of its significance?

a. Highly Significant b. Significant c. Slightly Significant d. Of No Significance

5. Comments (Please feel free to use a separate sheet for more detailed answers and include it with this form):

_____ _____
Name and Grade Organization

_____ _____
Position or Title Address